

A MONOGRAPH OF THE GENUS PHILADELPHUS *

SHIU-YING HU

Subgenus II. *Euphiladelphus*, subg. nov.**Philadelphus** subg. II. *Euphiladelphus*, subg. nov.*Philadelphus* Reihe. 1. *Corticatae* Koehne, Deutsche Dendr. 179, 180. 1893.*Philadelphus* Reihe 3. *Decorticatae racemoseae* Koehne, l. c. 180, 182.*Philadelphus* Reihe 4. *Decorticatae pauciflorae* Koehne, l. c. 180, 184, pro parte.*Philadelphus* Sect. 2. *Stenostigma* Koehne in Gartenfl. 45: 450. 1896, pro parte; et in Mitt. Deutsche Dendr. Ges. 1904(13): 77, 81. 1904, pro parte.TYPE SPECIES: *P. coronarius* Linn.

Frutex erectus, inflorescentiis racemosis, vel floribus ternatis vel solitariis, hypanthiis obconicis, subcampanulatis vel subglobosis, glabris vel pubescentibus; staminibus 25 usque ad 90; ovariis semi-inferioribus vel inferioribus; stylis partibus superis plerumque liberis, stigmatibus linearibus vel dilatis; capsulis ellipsoideis vel subglobosis; seminibus longi-vel brevi-caudatis; foliis oppositis, ovatis, serratis, denticulatis vel integris, triplinerviis or quintuplinerviis, gemmis axillaribus inclusis.

This subgenus has a wide range of distribution in the northern temperate zone, between latitudes 25°–50° N. From southern Europe eastward, across the mainland of Asia to Japan and then from western North America to south eastern United States its range is almost continuous. The only two interruptions occur in western and central Asia and the central and northern sections of the Great Plain States in the United States. Obviously the primary cause of these disjunctions is low precipitation. The Amur River region in northeastern Asia and the Columbia River region in western North America register its highest latitudinal distribution and the Himalayan region in Asia and the Rocky Mountain region in North America mark its highest altitudinal distribution. It has 41 species in three sections. Their distributions are as illustrated in Maps 2 and 3.

Section 3 *Pauciflorus* (Koehne), stat. nov.**Philadelphus** subg. II. *Euphiladelphus* sect. 3. *Pauciflorus* (Koehne), stat. nov.*Philadelphus* Reihe 4. *Decorticatae pauciflorae* Koehne in Deutsche Dendr. 180, 184. 1893, pro parte.

* Continued from volume XXXV, page 333.

Philadelphus sect. *Poecilostigma* Koehne subsect. *Speciosi* Koehne in Gartenfl. 45: 450. 1896; et in Mitt. Deutsche Dendr. Ges. 1904(13): 77, 79. 1904. — Engler, Pflanzenf. ed. 2. 18a: 193. 1930.

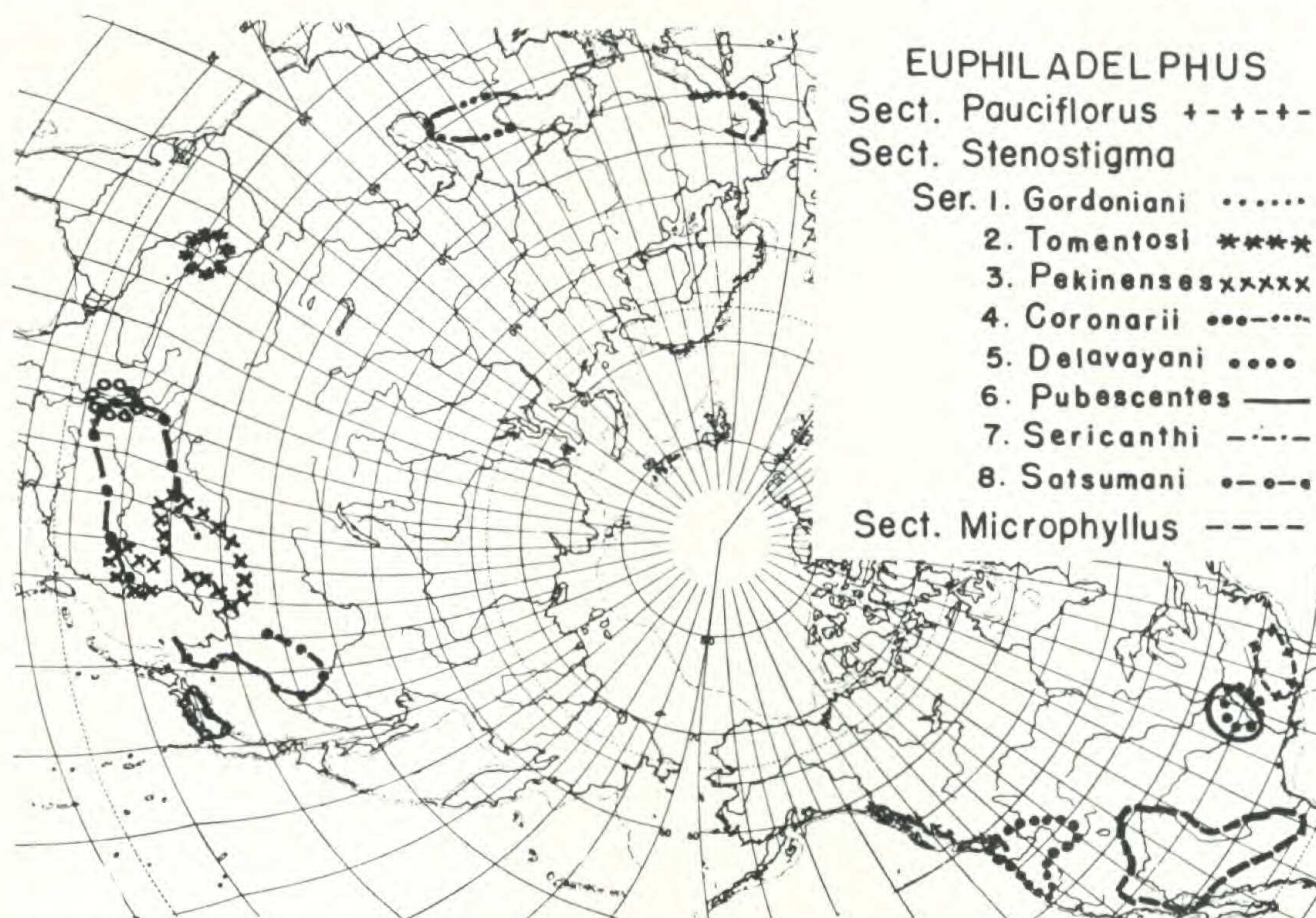
Philadelphus Grandiflori Rydb. in N. Am. Fl. 22: 163. 1905, in clavis, s. stat. — Beadle in Small, Man. South. Fl. 598. 1933.

Philadelphus ser. 4. *Speciosi* (Koehne) Rehder, Man. Cult. Trees Shrubs ed. 2, 272. 1940; et Bibliogr. Cult. Trees Shrubs 194. 1949.

TYPE SPECIES: *P. inodorus* Linn.

Archiving shrub with slender branchlets sweeping the ground, the bark exfoliating; leaves ovate, ovate-elliptic, elliptic, or lanceolate, dentate, rarely subentire; flowers solitary, ternate or in true dichasia; sepals foliaceous, long acuminate; petals oblong or rhomboid, rounded or obtuse at the apex; stamens 60–90; ovary with highly attached placentas, the style equal or longer than the longest stamens, the apical end divided, the stigma oar-shaped, the adaxial surfaces longer than the abaxial ones; capsules ellipsoid or subobovoid, with median persistent sepals; seeds long-caudate. Two species, many varieties. Native of the southern Appalachian region of the United States.

The type species of this section, *P. inodorus* Linn., was discovered by Mark Catesby on the bank of the Savannah River between South Carolina and Georgia. Unfortunately his artist overlooked the critical leaf characters of the plant, and instead of the faintly denticulate triplinerved leaves he depicted entire pinnate-nerved leaves. Linnaeus validated the species on the basis of Catesby's description and illustration. In trying to present a contrasting character for distinguishing this American species



MAP 2. The distribution of the sections and series of the subgenus EUPHILADELPHUS.

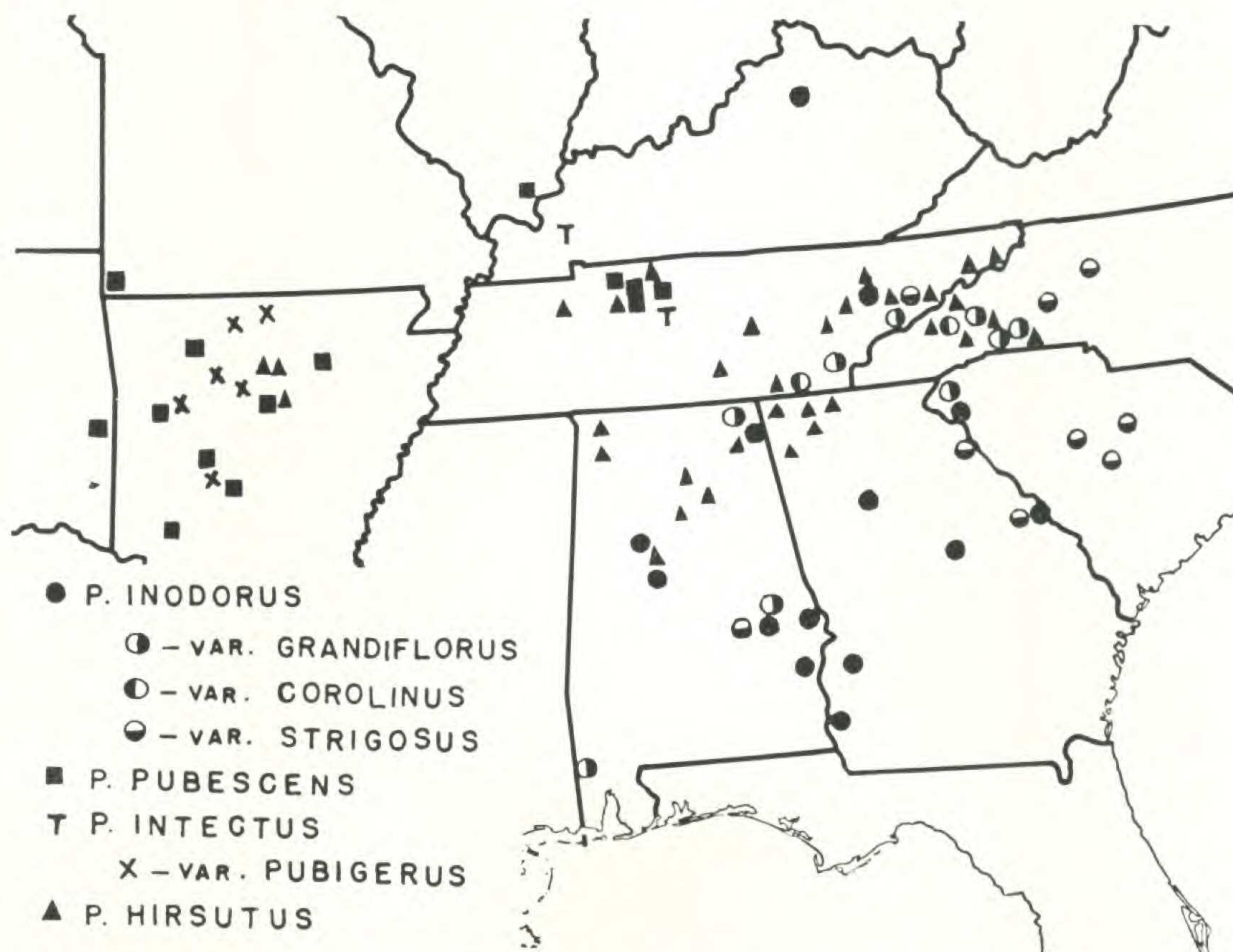
from the European one, he remarked "foliis integerrimis." Meanwhile, attempts at introducing this species from America to Europe were made. Dr. Dale in 1738 shipped both seeds and living plants to England. Miller who received this material failed to germinate the seeds. The living specimen that he planted in the Chelsea Garden was destroyed by the cold winter of 1740. There does not seem to be a successful introduction of the plant in Europe until the beginning of the nineteenth century. Thus from the time of the discovery of the first species of this section to the end of the eighteenth century the botanical records about *P. inodorus* Linn. were all from one source, that is, Catesby's Natural History of Carolina, and as a matter of fact the authors of these records, misled by the illustration, all stressed the entire leaf character of the plant. But among the natural population in this section of *Philadelphus* there is no plant that really possesses entire leaves. The leaves of some form may appear more nearly entire than the others, but leaves with small teeth actually exist on all variants, cultivated as well as the natural ones. By the beginning of the nineteenth century more plants were introduced from Carolina and Georgia to Europe under the name of *P. inodorus* Linn. As botanists were looking for an entire-leaved form to represent this binomial, the dentate-leaved material was named *P. grandiflorus* Willd. (1809), *P. laxus* Schrad. (1825), and half a dozen other synonyms as enumerated in Lavallée, Arb. Segrez. Enum. 114. 1877. The large amount of spontaneous material that I have examined convinces me that the formerly recognized species, *P. grandiflorus* Willd., and *P. laxus* Schrad., are merely different forms of a species with heterogeneous leaf shape, size and margins. Fostered by growers, propagated and distributed through cuttings, these forms have maintained their distinction in gardens since their discoveries. But when they are projected on the spectrum of variations exhibited by a large number of specimens collected from the homeland of *P. inodorus* Linn. they appear to be nothing but a few transitional forms. In this paper, these forms are treated as varieties.

Beadle in 1902 discovered a species with pubescent pedicels and hypanthia from the Coosa River region in Georgia. This discovery makes the second species of the section Pauciflorus.

This section is endemic to the southern Appalachian Mountains. The Great Smoky and the Lookout Mountains are the centers of the concentration of its species, and the Stamping Ground in Kentucky, Statesville in North Carolina, Santee River region in South Carolina, Coheelee Creek in Georgia and Mobile in Alabama mark the periphery of their overlapping ranges. The specimens collected from the cliffs on the Delaware River in Pennsylvania seem to be out of the range and they probably represent some escapes. As illustrated in Map 2, there seems to be no marked geographical separation between *P. inodorus* Linn. and *P. inodorus* Linn. var. *grandiflorus* (Willd.) Gray. *Philadelphus inodorus* Linn. var. *laxus* (Schrader) S. Y. Hu has been collected only once in nature, and that was on Great Smoky Mountain. *Philadelphus inodorus* Linn. var. *carolinus* S. Y. Hu occurs both in the Blue Ridge area of North Carolina and the

Lookout Mountains at the Georgia-Alabama-Tennessee border. *Philadelphus inodorus* Linn. var. *strigosus* Beadle is only known from the type locality and a plant cultivated in the Arnold Arboretum.

In this study, I have examined 191 specimens representing 161 collections that belong to this section, and have observed very little morphological modification which leads to speciation. This scarcity of variations apparently indicates the stability of the species of the sections.



MAP 3. The distribution of the major species of *Philadelphus* in southeastern United States.

KEY TO THE SPECIES

- A. Pedicels and hypanthia glabrous 15. *P. inodorus*.
 AA. Pedicels and hypanthia pubescent 16. *P. floridus*.

15. *Philadelphus inodorus* Linn. Sp. Pl. 470. 1753. — Miller, Gard. Dict. [834]. 1768. — Walter, Fl. Carol. 146. 1788. — Willd. Sp. Pl. 2: 948. 1800. — Barton, Elem. Bot. pl. 18, fig. 1. 1803. — Michx. Fl. Bor. Am. 1: 283. 1803. — Aiton, Hort. Kew. ed. Alt., 3: 180. 1811. — Pursh, Fl. Am. Sept. 1: 329. 1814. — Elliott, Sketch 1: 538. 1821. — DC. Prodr. 3: 206. 1828. — Schrader in Linnaea 12: 401. 1838. — Loudon, Arb. Frut. Brit. 2: 952, fig. 647. 1838. — Torr. & Gray, Fl. N. Am. 1: 594. 1840. — Chapman, Fl. South. U.S. 156. 1860. — Koch, Dendr. 338. 1869. — Gray, Man. ed. 2, 146. 1856. — Lavallée, Arb. Segrez. Enum. 114. 1877. — Dippel, Handb. Laubh. 3: 333. 1893. — Koehne, Dendr. 184. 1893; in Gartenfl. 45:

507. 1896; et in Mitt. Deutsche Dendr. Ges. 1904(13): 80. 1904. — Britton & Brown, Ill. Fl. 2: 186, fig. 1861. 1897; ed. 2, 232, fig. 2189. 1913. — Beadle in Small, Fl. 507. 1903; ed. 2, 506. 1913 et in Small, Man. South. Fl. 598. 1933. — Schneider, Ill. Handb. Laubh. 1: 366. 1905. — Rydb. in N. Am. Fl. 22: 206. 1905. — Syereishtchikof, Ill. Fl. Mosc. 2: 220, fig. [1.] 1907. — Standley & Calderon, Pl. Salv. 88. 1925. — Fernald, Gray's Man. ed. 8, 746. 1950. — Gleason, Ill. Fl. 2: 273. 1952.

Philadelphus flore albo majore inodoro Catesby, Nat. Hist. Car. 2: 84, pl. 84. 1743.

Syringa inodora Moench, Meth. 678. 1794.

TYPE: Catesby pl. 84. LECTOTYPE: *Harper 3353* (A).

An arching shrub, 1–3 m. high, bark of the second year's growth castaneous, exfoliating; current year's growth glabrous. Leaves ovate-elliptic or elliptic, rarely broad elliptic, subentire, faintly dentate, 5–9 cm. long, 2–3.5 cm. wide, acute or sub-cuneate rarely obtuse at the base, short acuminate at the apex, sparsely appressed pilose, rarely subglabrous above, glabrous except the primary nerves and their angles beneath. Flowers 1, 3, rarely up to 9, cymose, the pedicels, hypanthia, and sepals all glabrous; corolla disciform, 4–5 cm. across, the petals oblong, 2 cm. long, 1.5–1.8 cm. wide; stamens 60 up to 90; style equal to the longest stamens in length, glabrous, the stigmas dilated, the abaxial surface definite. Capsules subglobose-ellipsoid, 8 mm. long, 7 mm. diameter, the seeds long-caudate.

UNITED STATES: Pennsylvania: cliffs along the Delaware River, T. C. Porter, June 29, 1885 (NY), July 11, 1886 (G). Virginia: Caroline Co., Return, *Fernald, Long & Abbe 14168* (G); Polk Co., near Columbus Mountainside, *E. C. Townsend*, in 1897 (CU). North Carolina: without precise locality, *G. R. Vasey* in 1878 (US). South Carolina: Oconee Co., Tomassee Knob, *H. D. House 2070* (NY, US); Oconee County, Seneca River, *K. M. Wiegand & W. E. Manning*, August 1927 (CU). Georgia: cliffs along the Savannah River, at the Locks above Augusta, *C. S. Sargent*, March 20, 1908 (A, TOPOTYPE?); "In Georgia et Carolina circa urbem Augusta," *S. T. Olney & J. Metcalf 122* (G); Baldwin Co., Milledgeville, *T. G. Harbison 1549* (A); *1551* (A); Burke Co., *McBean, J. H. Pyron & R. McVaugh*, April 1938 (CU); Clarke Co., common on river banks, *J. H. Miller*, May 1925 (CU); Columbia Co., Lincolnton, Little River, *W. H. Duncan 9496* (CU); Dekalb Co., *John Davis 1852* (US), *7217* (BH), July 1921 (CU); Early Co., Coheelee Creek, *R. F. Thorne 7424* (CU); Early Co., Gulf Coastal Plain, *R. F. Thorne & W. C. Muenscher 8556* (CU); Macon Co., *I. Darby* in 1836 (NY); Steward Co., *R. M. Harper 1089* (NY, US); without precise locality, *Dr. Boykin* (NY). Kentucky: Scott Co., Stamping Ground, *J. W. Singer 84* (US). Tennessee: Knox Co., Knoxville, *J. N. McCarroll 42*; *A. Ruth 256* (MO,US), *260* (NY), *345* (G), *2023* (NY), May 21, 1887 (TENN), July 15, 1900 (TENN); Rutherford Co., Murfreesboro, *E. J. Palmer 35494* (A, MO, NY); Interior of Tennessee, without precise locality, Herb.

I. Carey (NY). Alabama: Dekalb Co., Mentone, *Loring* in May 1899 (US); Lee Co., Auburn, *F. S. Earle & L. M. Underwood*, April 25, 1896 (NY); Tuscaloosa Co., Brush Creek, *R. M. Harper* 3353 (A,BH, G, NY, US); same county, Black Warrior River, *R. I. & E. R. Clausen*, April 1952 (CU); same locality, *E. J. Palmer* 35362 (A,MO,NY,US), 35363 (A,NY); Holt, *H. E. Wheeler* 1318 (A); Banks of Alabama River, *R. S. Cocks* in July 1914 (A); Bank of Chattahoochee River, *Chapman* in Dec. 1867 (NY); Without precise locality, *S. B. Buckley* in June 1841 (NY); *Chapman* (NY); Herb. P. V. LeRoy (NY).

CULTIVATED: United States: Massachusetts: Arnold Arboretum no. 15347, collected on June 30, 1913 (A), Arnold Arboretum no. 5312, collected on June 12, 1918 (BH), Aug. 8, 1918 (BH); Hort. Bot. Cambridge, *A. Rehder*, June 29, 1907 (A); Jamaica Plain, *C. E. Faxon*, June 20, 1911 (A). New York: Normal College Ground, *A.R.R.* on June 4, 1889 (NY). New Jersey: Somerset Co., Watchung, *H. N. Moldenke* 1690 (NY), 2515 (BH). Pennsylvania: Delaware Co., Media, *F. W. Pennell* 12976 (NY). Washington D.C.: U. S. Dept. Agri. Ground, *B. Sudworth*, May 18, 1891 (US), May 22, 1891 (US); *G. Vasey* in 1873 (US), in 1882 (US); Maryland Agri. College, *G. Vasey* in 1873 (US); Rock Creek, *L. F. Ward*, May 30, 1883 (US), May 20, 1886 (US). Missouri: Marion Co., Hannibal, Riverside Cemetery, *J. Davis* 2306 (MO). Wisconsin: Green Bay, *J. H. Schuette* (NY).

Philadelphus inodorus has been much misinterpreted in botanical literature because of the over emphasis of various authors on the margin of the leaves and their disregard of the shape and base of the leaves and the flower characters as illustrated in Catesby's plate. Among modern collections made from southeastern United States, Catesby's illustration of the flowering and fruiting branchlets of the species is duplicated in *Palmer* 25362, 35494, *Harbison* 1551 and *Harper* 3353, the last mentioned specimen deposited in the herbarium of the Arnold Arboretum has been selected as the lectotype for the species.

Judging from the specimens which I have examined, the Great Smokies is the center of concentration of this species. The specimens from eastern Pennsylvania, eastern Virginia, northern Kentucky and the Gulf Coastal Plain in Georgia either mark the periphery of its natural range or they were collected from escaped plants. The available field notes indicate that the habitats of *P. inodorus* Linn. are steep wooded slopes, banks of rocky streams or limestone bluffs. Duncan recorded the plant as attaining a height of eleven feet. The stems are slender and arching. The natural population flowers in middle April or early May in Georgia and Alabama. The cultivated ones bloom in middle June in Boston. Regarding the habit, Catesby remarked the plant being a small tree, rising to a height of about sixteen feet or upwards with a slender trunk. As far as I know all species of *Philadelphus* are shrubs. Catesby's remark was either due to his loose concept of the term tree or due to the crowded condition in which that particular plant grew with no chance to branch at the base.

KEY TO THE VARIETIES AND FORMS OF *P. INODORUS*

- A. Sepals glabrous outside.
 - B. Leaves ovate-elliptic, elliptic or lanceolate, the base obtuse, acute or cuneate; remotely coarse-toothed.
 - C. Leaves ovate-elliptic; corolla discoid.
 - D. Half-open flower campanulate, the petals first suborbicular, later oblong 15a. var. *grandiflorus*.
 - DD. Half-open flower quadrangular, the petals first rhomboid, later orbicular 15b. forma *quadranguliflorus*.
 - CC. Leaves elliptic or lanceolate; corolla cruciform 15c. var. *laxus*.
 - BB. Leaves ovate, the base rounded; margin faintly denticulate or semi-entire 15d. var. *carolinus*.
- AA. Sepals with few hairs on the outside 15e. var. *strigosus*.

- 15a. *Philadelphus inodorus* var. *grandiflorus* (Willd.) Gray, Man. ed. 2, 146. 1856, ed. 4, 146. 1865; ed. 5, 166. 1867. — A. Wood, Am. Bot. Flor. 116. 1879. — Nemoto, Fl. Jap. Suppl. 294. 1936. — Fernald, Gray's Man. ed. 8, 746. 1950.

Philadelphus grandiflorus Willd. Enum. Pl. Hort. Bot. Berol. 511. 1809. — DC. Prodr. 3: 206. 1828. — Elliott, Sketch 1: 538. 1821. — Schrader in Linnaea 12: 395. 1838. — Sweet, Brit. Fl. Gard. ser. 2, 1: pl. 8. 1829. — Loudon, Arb. Frut. Brit. 2: 954. 1838. — Torr. & Gray, Fl. N. Am. 1: 595. 1840. — Walp. Rep. 2: 151. 1843. — Young, Fl. Texas 290. 1873. Lavallée, Arb. Segrez. Enum. 115. 1877. — Britt. & Brown, Ill. Fl. 2: 186, fig. 1862. 1897. — Nicholson, Ill. Dict. Gard. 3: 95. 1886. — Watson & Coulter, Gray's Man. ed. 6, 174. 1890. — Nicholson, Kew Hand-list 1: 225. 1894, ed. 2, 375. 1902. — Schneider, Ill. Handb. Laubh. 1: 366, fig. 234g-j, 236e. 1905. — Rydb. in N. Am. Fl. 22: 168. 1905. — Rehder, Man. Cult. Trees Shrubs 278. 1927; ed. 2, 272. 1940; et Bibliogr. Cult. Trees Shrubs 194. 1949. — Bean in Chitt. Dict. Gard. 3: 1546. 1951.

Philadelphus speciosus Schrader ex DC. Prodr. 3: 206. 1828; et in Linnaea 12: 43. 1838. — Koehne, Dendr. 184. 1893; in Gartenfl. 45: 507. 1896; et in Mitt. Deutsche Dendr. Ges. 1904(13): 80. 1904.

Philadelphus macranthus Jacques in Hort. Univ. 2: 17. 1841.

Philadelphus gloriosus Beadle in Biltm. Bot. Stud. 1: 159. 1902; in Small, Fl. 507. 1903, ed. 2, 506. 1913; et in Small, Man. South. Fl. 599. 1933. — Rydb. in N. Am. Fl. 22: 169. 1905. — Schneider, Ill. Handb. Laubh. 1: 366. 1905.

Philadelphus columbiensis Hort. ex Nicholson, Kew Hand-list 1: 225. 1894, ed. 2, 375. 1902, nomen nudum.

Deutzia sanguinea Hort. ex Nicholson, ll. cc.

Philadelphus inodorus sensu Gleason, Ill. Fl. 2: 273. 1952, pro parte, non Linn.

TYPE: Cultivated plant in the Botanical Garden of Berlin. LECTOTYPE: Biltmore Herb. No. 4333a, from rocky banks of Grand River, Rutherford County, North Carolina, deposited in Herbarium, Arnold Arboretum.

A mound-like shrub with slender arching branchlets, bark of two-year old growth castaneous, exfoliating; leaves ovate or ovate-elliptic, 5–11 cm. long, 2.5–5, sometimes up to 6.5 cm. wide, glabrescent or very sparsely strigose on both surfaces, bearded in the axils of primary nerves beneath, denticulate, the teeth usually coarse and remote, acute or rarely rounded at the base, acuminate at the apex; flowers ternate, solitary, or 7–9 in a true dichasium, pedicels 3–15 mm. long; sepals ovate, 8–12 mm. long, 5–6 mm. wide, acuminate; corolla campanulate at first, later semidisciform, 4–5.5 cm. across, the petals suborbicular, becoming oblong, 20–26 mm. long, 15–22 mm. wide; capsules ellipsoid, 12–15 mm. long, 6–9 mm. in diameter.

UNITED STATES: Virginia: Without precise locality, *Stebbins* (NY). North Carolina: Buncombe Co., Blue Ridge, *A. Gray* in 1843 (NY); Polk Co., Skyuka Mt., *J. R. Churchill*, May 25, 1899 (BH), same county, Pacolet River, *J. R. Churchill*, May 29, 1899 (BH, TENN); Rutherford Co., rocky banks of Grand River, near Chimney Rock, *Biltmore Herb. 4333a* (A, NY, US); same county below Hickory Falls, *Correll, Blomquist & Garren 5140* (A); mountains of North Carolina, *G. R. Vasey* in 1878 (NY); Hickory Mt. Gap, *Gray* (NY); Rutherford Gap, *S. B. Buckley*, August 1841 (NY). South Carolina: Oconee Co., along streams and rivers, *A. P. Anderson 1173* (US); Tomassee Knob, *H. D. House 2056* (NY, US); Clemson College 2116 (NY, US). Georgia: Dade Co., Lookout Mt., *E. J. Palmer 35446* (A, MO); Lookout Mt. between Tennessee and Georgia, *J. R. Churchill*, April 30, 1906 (TENN), May 3, 1906 (BH); Macon, Ocumulgee River Swamp, *J. K. Small*, May 18–24, 1895 (NY), July 8–9, 1895 (A); Rome, cliffs of Cocsa, *T. G. Harbison 39* (A); same area, Black's Bluff, *Alexander, Everett & Pearson*, Oct. 1933 (NY); Sugalo River near its juncture with Senesa, *L. R. Gibbs* in 1885 (NY); Wilkes Co., Little River, *T. G. Harbison*, July 14, 1919 (A, US); without precise locality, *Herb. Chapman, 878* (US); Benton Co., Rockport, *E. B. Harger 7892*(G). Tennessee: Polk Co., *Sharp, Adams & Felix 11406* (A, TENN); Sevier Co., *H. M. Jennson 1208* (TENN). Alabama: Lee Co., Auburn, *E. T. Earle*, April 25, 1896 (US); Jackson Co., Bridgeport, *Biltmore Herb. No. 4333e* (NY); Lisbon, *C. Mohr*, July 24, 1885 (US); Mobile Co., Mobile, *E. Smith* in 1891 (A, US).

CULTIVATED: Europe: Germany: Horl. Götting, *A. Rehder 387* (A), 1644 (A); *Schrader* in 1827 (TYPE of *P. speciosus* Schrader; photograph, A). England: Kew, *Geo Nicholson 1316* (A). Asia: China: Shanghai, St. John's University, *L. H. Bailey*, May 14, 1917 (BH), May 23, 1917 (BH).

The plant cultivated in Shanghai is reported by Bailey as producing fragrant flowers.

Willdenow characterized *P. grandiflorus* by the ovate, acuminate, and dentate leaves which were fasciculate pilose in the principal nerve-angles beneath. He remarked that the plant was introduced to the Botanical Garden of Berlin as *P. inodorus*. Willdenow's concept of the species had been adopted by European botanists outside Germany for over a half century without questioning. Koch and Koehne, two outstanding German students of the genus, never accepted Willdenow's species. On observa-

tion of spontaneous material Gray found the characters used by Willdenow to be unreliable for specific distinctions and in 1856, in the second edition of his Manual of Botany, he treated Willdenow's species as a variety of *P. inodorus* Linn. This trinomial existed in Gray's Manual for over thirty years in four different editions. In 1890 when Watson and Coulter revised Gray's Manual, they re-established Willdenow's species for no obvious reasons. Meanwhile, Britton and Brown tried to distinguish *P. grandiflorus* Willd. from *P. inodorus* Linn. on the strength of the relative length of the calyx lobes, and on their geographical distribution. These authors maintained that *P. grandiflorus* Willd. had calyx lobes about twice as long as the tube and that it occurred on low ground from Virginia to Tennessee and Florida while *P. inodorus* Linn. had calyx lobes equalling the tubes and occurred principally in the mountains, from Virginia to Georgia and Alabama. This character, the proportion of sepals and hypanthium, had also been adopted for distinguishing *P. grandiflorus* Willd. and *P. inodorus* Linn. by Rydberg and Beadle. Gleason in 1952 maintained that the observations that these authors had made were not substantiated on an examination of the plant. Swinging to the other extremity, he amalgamated the two species. Fernald in 1950, in the eighth edition of Gray's Manual adopted Gray's concept, and I think he is justified in so doing.

Jacques in 1841 described a plant cultivated as *P. inodorus* in the garden of M. Bertin and named it as *P. macranthus*. He characterized that plant as having ovate-elliptic or ovate-oblong dentate leaves which are narrowed at the base, and ternate large flowers with rounded petals. Judging from his description the plant he saw must belong to *P. inodorus* var. *grandiflorus*.

Britton and Brown and Small all claimed the taxon to occur in Florida. I have seen no spontaneous specimens from that state.

Schrader in 1828 described *P. speciosus* as a plant possessing an 8-celled ovary. His illustration indicated that the cross section he made was cut through the tip of a young fruit. Due to a partial false septa projecting from the roof of each cell of the ovary such a cross section would appear 8-celled. Through the courtesy of Dr. Charles Baehni, Director of the Conservatoire et Jardin Botaniques, Genève, I have the photocopies of the original drawings and the text of Schrader's manuscript as well as the photographs of the types of Schrader's species. By the help of one of the curators of the same institution, Mr. Weibel, I received a careful description of the indumentum of the floral parts, including the hypanthium, sepals, petals, styles and disk, of all Schrader's species. I have no doubt that *P. grandiflorus* Willd. and *P. speciosus* Schrader are conspecific.

Beadle in 1902 on the strength of an abrupt contraction of the base of the capsule described *P. gloriosus* from the banks of the Coosa River near Rome in Georgia. The degree of fullness of a capsule has a profound effect on the appearance of the base of the fruit in *Philadelphus*. I have

examined many collections from the Coosa River region and found no fruit character distinctive specifically. Beadle's material appears to have fuller fruits.

15b. *Philadelphus inodorus* Linn. var. *grandiflorus* (Willd.) Gray
forma *quadranguliflorus*, f. nov.

Frutex erectus, ramis pendulis, bienniis 5 mm. diametro, corticibus exfoliatis, hornotinis glabris; foliis oblongo-ovatis vel ovatis, 3–10 cm. longis, 1.5–5 cm. latis, basi obtusis vel rotundatis, apice acuminatis, subtiliter remoto-serratis vel subintegris, supra glabris vel adpresso-pilosis, subtus ad nervis primariis villosis barbatisque; flores 1 vel 3, raro usque ad 9, cymosis, corolla quadrangulari, petalis orbicularibus, 2.2 cm. longis, 2.6 cm. latis.

UNITED STATES: North Carolina: Rutherford Co., bank of the Broad River near Chimney Rock, Biltmore Herb. No. 6555 (NY). South Carolina: Kershaw Co. near Camden, along Wateree River, *E. J. Palmer* 39949 (A). Georgia: Rome, cliffs of Coosa River, *C. S. Sargent*, May 6, 1899 (A, TYPE).

CULTIVATED: Germany: Hort. Götting. *A. Rehder* 388 (A), 1672 (A). U.S.A.: Arnold Arboretum No. 5312, *C. E. Faxon* June 14, 1911 (A), June 16, 1911 (A). Arnold Arboretum No. 4159–2, collected on August 8, 1918 (BH); Arnold Arboretum No. 15340, collected on Oct. 3, 1916 (A); Arnold Arboretum No. 15357, collected on June 20, 1904 (A). New York: Rochester, Highland Park, *R. E. Horsey*, July 17, 1918 (BH), Sept. 4, 1918 (BH).

This form can easily be recognized by its square flowers, the petals are always broader than long and they overlap each other at anthesis. It was probably first introduced by Sargent from Georgia and distributed under the name *P. grandiflorus*. The broad petals of the flowers are very distinctive, and when the flowers first open, they appear square.

15c. *Philadelphus inodorus* var. *laxus*, comb. nov.

Philadelphus laxus Hort. ex Schrader in DC. Prodr. 3: 206. 1828; et in Linnaea 12: 398. 1838. — Loudon, Arb. Frut. Brit. 2: 954, fig. 677. 1838. — Lindl. in Bot. Reg. 25: pl. 39. 1839. — Lavallée, Arb. Segrez. Enum. 115. 1877. — Koehne, Dendrol. 184. 1893; in Gartenfl. 45: 507. 1896; et in Mitt. Deutsche. Dendrol. Ges. 1904(13): 79. 1904. — Rydb. in N. Am. Fl. 22: 174. 1905. — Schneider, Ill. Handb. Laubh. 1: 365. 1905. — Rehder, Man. Cult. Trees Shrubs 278. 1927; ed. 2, 272. 1940; et Bibliogr. Cult. Trees Shrubs 194. 1949. — Bean in Chitt. Dict. Gard. 3: 1546. 1951.

Philadelphus grandiflorus Willd. var. *laxus* (Schrader) Torr. & Gray, Fl. N. Am. 1: 595. 1840. — Walp. Rep. 2: 151. 1843. — Nicholson, Kew Hand-list 1: 225. 1894; ed. 2, 375. 1902; et Ill. Dict. Gard. 3: 95. 1886. — Anon. in Garden 40: 289. 1891. — Raffl. in Gard. Chron. III. 43: 82, fig. 36: 1908.

Philadelphus humilis hort. ex Schrader in DC. Prodr. 3: 206. 1828, in syn.

Philadelphus ignea Hort. ex Nicholson, Kew Hand-list 1: 225, 1894, in syn.

Philadelphus pubescens Lodd. Cat. ed. 16, 1836, nomen nudum. — Loudon, Arb. Frut. Brit. 954. 1938, in syn., non Loisel., 1820.

TYPE: *Schrader*, (Conservatoire et Jardin Botaniques, Genève).

A mound-like shrub with arching branches, the branchlets slender, pendulous, touching the ground, the bark of second year's growth exfoliate; leaves lanceolate or elliptic-lanceolate, 4–6 cm. long, 1.5–2.5 cm. wide, cuneate or acute at the base, acuminate at the apex, glabrescent or sparsely appressed pilose above, sparsely pubescent beneath, especially along the principal nerves; beard in the nerve-axils, the margin remotely fine serrate, rarely subentire; flowers 4.5–5.5 cm. in diameter, corolla cruciform, the petals oblong, 2.3 cm. long, 1.5 cm. wide.

UNITED STATES: North Carolina: Swain Co., Nantahala Gorge, *K. M. Wiegand*, June 1931 (CU).

CULTIVATED: Europe: Switzerland, Botanical Garden of Geneva, *Schrader* (TYPE of *P. laxus* *Schrader*, photo in A); without collector, June 1826 (NY). Germany: ex. Herb. Dendrol. *Koehne* 18 (MO); Hort. Bot. Jena, *A. Rehder*, June 1895(A); Hort. Mund, *A. Rehder* 2256 (A), 2268 (A); Hort. Musk, *A. Rehder*, July 2, 1888 (A); Hannover, Bot. Garten Forstakademie, *H. Zabel*, June 13, 1894 (A). Austria: Hort. Bot. Wien, *C. Schneider*, June 6, 1902 (A). France: Segrez. Lavallée's Arboretum, June 16, 1907 (A); Les Barres, Vilmorin's Arboretum No. 7110, June 17, 1901 (A). United States: Boston: Arnold Arboretum No. 15353B, *R. B. Clark* (BH); New York: New York City, *M. Ruger* (NY); Rochester Highland Park, *R. E. Horsey*, June 16, 1918 (BH), Sept. 21, 1917 (BH); Ithaca, *Bailey*, July 5, 1916 (BH). North Carolina: Biltmore, *W. H. Manning* (BH). Tennessee: Chilhowee Park, *L. D. Greenwood* 2 (TENN). Arkansas: Hot Springs, *E. J. Palmer* 24869 (MO).

Schrader described *P. laxus* from a plant cultivated in the Botanical Garden of Geneva, and characterized it as having dentate leaves, which were pubescent beneath, and having solitary or ternate flowers. He gave as the origin of that taxon North America. A specimen in the Herbarium of the New York Botanical Garden which was distributed by the Geneva Botanic Garden under the name *Philadelphus inodorus* matches *Schrader*'s plate and the photograph of his type in every respect. It was collected in June 1826. As *Schrader* finished his work in 1827, this specimen was probably collected from the type plant at the time when *Schrader* made his studies. This specimen is identical with *Wiegand*'s collection made in Nantahala Gorge of North Carolina. Incidentally *Wiegand*'s collection represents the only specimen that I have examined which is not marked "cultivated." This variety differs from typical *P. inodorus* Linn. only in its narrower leaves which are sparsely pubescent beneath. As this leaf-character is not specifically distinctive, I therefore treat *Schrader*'s species as a variety of *P. inodorus* Linn.

In the Vilmorin Arboretum, Les Barres, France, a mistake was once made in recording the origin of a plant. A tag labeled "P. spec. China No. 1505" was attached to a *laxus* type of *Philadelphus*. A specimen from that plant was sent to *Koehne*, who accordingly in 1904 advanced a sup-

position that *P. laxus* Schrader was endemic to China, specifically Szechuan Province. In so doing Koehne overlooked the fact that at that early period, Szechuan, being situated in the interior region, was not accessible to Europeans. As Bretschneider remarked that during the eighteenth century and the early half of the nineteenth century, Canton was the only Chinese port open to European trade,¹ and *Philadelphus* does not grow in Canton, either in a wild state or in cultivation, it was highly impossible for such a plant to be introduced to Europe from China.

In the European gardens *P. inodorus* Linn. var. *laxus* S. Y. Hu existed under different binomials some of which also appear as synonyms of *P. lewisii* Pursh and *P. hirsutus* Nutt.

Torrey and Gray in 1840 interpreted Schrader's species as a variety of *P. grandiflorus* Willd. It is true that these two taxa are closely related, especially when the remotely coarse dentate leaves are considered. In this study they are both treated as varieties of *P. inodorus* Linn. The var. *grandiflorus* is distinguished by its broad ovate leaves and discoid corolla and var. *laxus* by its lanceolate or elliptic-lanceolate leaves and cruciform corolla.

15d. *Philadelphus inodorus* Linn. var. *carolinus* var. nov.

Philadelphus inodorus sensu Sims in Bot. Mag. 36: pl. 1478. 1812. — Lavallée, Arb., Segrez. Enum. 114. 1877. — Rehder, Man. Cult. Trees Shrubs 278. 1927, ed. 2, 272. 1940; et Bibliogr. Cult. Trees Shrubs 194. 1949. — Bean, Trees, Shrubs, ed. 7, 2: 414. 1950; et in Chitt., Dict. Gard. 3: 1546. 1951, non Linn. 1753.

Philadelphus columbarius myrtiflorus Hort. ex Lavallée, Arb. Segrez. Enum. 114. 1877., in syn.

Philadelphus cordatus Hort. ex Lavallée, l. c., in syn.

Philadelphus cordifolius Hort. ex Lavallée, l. c., in syn.

Philadelphus coronarius nivalis Hort. ex Lavallée, l. c., in syn.

Philadelphus multiflorus Hort. ex Lavallée, l. c., in syn.

Philadelphus floribundus Hort. ex Lavallée, l. c., in syn., non Schrader, 1828.

Philadelphus grahami Hort. ex Lavallée, l. c., in syn.

Philadelphus zeyheri multiflorus Hort. ex Lavallée, l. c.

Frutex humilis, ramis pendulis, bienniis 2–4 mm. diametro, corticibus exfoliatis, hornotinis glabris; foliis subcoriaceis, integris vel subintegris, ovatis, 3.8 cm. longis, 2–4 cm. latis, basi rotundatis vel raro obtusis, apice breviter acuminatis, glabris vel supra sparse adpresso-pilosis et subtus ad nervis pilosis barbatisque; flores 1, vel 2, raro 3 usque ad 9, 4–6 cm. diametro, petalis suborbiculo-obovatis; staminibus 63 usque 90.

UNITED STATES: North Carolina: without precise locality, G. R. Vasey in 1878 (TYPE, US); Chimney Rock, Alexander, Everett & Pearson,

¹ E. BRETSCHNEIDER, History of European Botanical Discoveries in China, 155–156. 1898.

Sept. 27, 1933 (NY). Tennessee: Hamilton Co., Chattanooga, Ledges Jonas Bluff, Lookout Mountain, *S. R. Churchill* 449 (TENN).

CULTIVATED: Biltmore Herb. No. 7610 (A, G, MO, NY, US); Arnold Arboretum, *S. Y. Hu*, June 8, 1951 (A), July, 1952 (A); Arnold Arboretum No. 540-2, (Plant collected near Chimney Rock N. C.) *A. Rehder* on June 16, 1903 (MO). Arnold Arboretum No. 4159-1, collected on June 19, 1889 (A), June 26, 1902, June 28, 1904, June 14, 1911, June 23, 1916, June 26, 1916, Oct. 3, 1916 (All in A); Massachusetts Agricultural College, *C. H. Thompson*, June 7, 1921 (MO).

This variety is characterized by its ovate leaves with rounded or obtuse base and faintly denticulate or subentire margins. In nature it has very limited range of distribution. The material that I have examined all come from the mountains of western North Carolina and the adjacent southeastern Tennessee. The cultivated specimens in large American herbaria apparently all come from two sources, the one from a plant originally transplanted from the bank of the Flint River in Georgia by the Biltmore Herbarium (No. 7610), and the other from a plant originally transplanted from Chimney Rock in North Carolina as represented by the Arnold Arboretum field No. 540-2.

The introduction of this variety to European gardens was made about 1810. In 1812 a flowering specimen was presented to Sims by Wiltey of the Fulham Nursery. A colored plate was prepared from this specimen and was published under the name *P. inodorus*. A comparison of this plate with that of Catesby's reveals that those plates represent two different elements. That of Catesby depicts a plant with ovate-lanceolate leaves and oblong petals which are rounded at the apex and that of Sims' illustrates a plant with broad ovate leaves and semirhomboid petals obtuse at the apex. In this work the plant that Catesby illustrated is interpreted as the true *P. inodorus* Linn. while the plant that Sims described is identified as *P. inodorus* Linn. var. *carolinus* *S. Y. Hu*. Lavallée named his plant with the help of Sims' publication, thus the synonyms he listed under *P. inodorus* in the *Arboretum Segrezianum* are placed here as the synonyms of this variety. Rehder relied on a plant cultivated in the Arnold Arboretum for the description of *P. inodorus* in his *Manual*. As that plant is not a genuine *P. inodorus* Linn., Rehder's description applies only to this variety.

- 15e. *Philadelphus inodorus* Linn. var. *strigosus* Beadle in *Biltm. Bot. Stud.* 1: 159. 1902; in *Small, Fl.* 507. 1903, ed. 2, 506. 1913; et in *Small, Man. South. Fl.* 598. 1933. — *Schneider, Ill. Handb. Laubh.* 1: 366. 1905.

Philadelphus strigosus (Beadle) Rydb. in *N. Am. Fl.* 22: 168. 1905.

Philadelphus laxis Schrader var. *strigosus* (Beadle) Rehder in *Jour. Arnold Arb.* 1: 198. 1920; *Man. Cult. Trees Shrubs* 278. 1927; ed. 2, 272. 1940; et *Bibliogr. Cult. Trees Shrubs* 194. 1949.

TYPE: *A. C. Hexamer & F. W. Maier*, June 19, 1855 (G).

A straggling shrub up to 2 m. high, bark castaneous, exfoliating; leaves ovate or ovate-elliptic, 3–7 cm. long, 2–4 cm. wide, subentire, or faintly denticulate, obtuse or rounded at the base, acuminate at the apex, glabrous or partially sparsely strigose above, uniformly strigose beneath, bearded at the nerve-angles; flowers solitary or ternate, the pedicels and hypanthia glabrous, the sepals ovate, 8 mm. long, 5 mm. wide, sparsely villose on the outside; corolla disciform, 4–5 cm. across, the petals sub-orbicular, 2 cm in diameter; stamens about 90, the longest 1 cm. long; style as long as the longest stamens, the abaxial surface of the stigma 3 mm. long.

UNITED STATES: North Carolina: Burke Co., Tablerock, *H. D. Hasse* (NY); Iredell Co., Statesville, *M. E. Hyais 4986* (NY), May 1881 (NY). South Carolina: Kershaw Co., near Camden, *E. J. Palmer 39949* (NY, US); Lexington Co., *A. C. Hexamer & F. W. Maier*, June 19, 1855 (TYPE G); Santee River, *M. Tuomey* (NY); without precise locality, *M. A. Curtis* (MO). Georgia: Richmond Co., above August, *S. T. Olney & J. Metcalf*, April 1855 (NY); same area, at the Locks, *C. S. Sargent* on June 20, 1908 (A); Elbert Co., *T. G. Harbison 16* (A). Tennessee: Servier Co. *H. M. Jennison 367* (TENN). Alabama: Montgomery Co., Montgomery, *O. L. Justice*, April 20, 1941 (CU).

CULTIVATED: Europe: Bernhard Herb (MO). U.S.: Washington: Sequim, *J. M. Grant*, June 6, 1913 (NY). Missouri: St. Louis, Missouri Bot. Gard., *J. H. Kellogg*, May 21, 1902 (CU).

Beadle was justified in treating this taxon as a variety of *P. inodorus* Linn. for it differs from the genuine species only in its thicker covering of appressed, rather stiff hairs on the lower surface of the leaves and on the exterior of the sepals. Like *P. inodorus* Linn. it has glabrous pedicels and hypanthia. In the texture, shape, and margin of the leaves, much variation exists among the specimens cited above. So far as my records go, the earliest collection was made not long before 1847 by M. A. Curtis from South Carolina. It was presented to Engelmann in 1847 under the name *P. grandiflorus* Willd. The first cultivated record that I have seen is represented by some specimens of the Bernhard Herbarium. They were then cultivated in Europe under the name *P. inodorus* Linn. or *P. laxus* Schrad.

16. *Philadelphus floridus* Beadle in Biltm. Bot. Stud. 1: 160. 1902; in Small, Fl. 507. 1903; ed. 2, 506. 1913; et in Small, Man. South Fl. 599. 1933. — Schneider, Ill. Handb. Laubh. 1: 366. 1905. — Rehder in Jour. Arnold Arb. 1: 198. 1920; Man. Cult. Trees Shrubs 279. 1927; ed. 2, 273. 1940; et Bibliogr. Cult. Trees Shrubs 194. 1949, pro parte.

Philadelphus speciosus sensu Lindl. in Bot. Reg. 23: pl. 2003. 1837. — sensu Rydb. in N. Am. Fl. 22: 169. 1905, non Schrader ex DC. 1828.

Philadelphus magnificus sensu Rehder, Man. Cult. Trees Shrubs 278. 1927, ed. 2, 1940; et Bibliogr. Cult. Trees Shrubs 194. 1949, pro parte, non Koehne.

TYPE: Biltmore Herb. No. 11376, a flowering specimen, collected on May 3rd, 1899.

Shrub up to 3 m. high, branchlets brown, the second year's growth castaneous. Leaves ovate-elliptic or broad-elliptic, 4–10 cm. long, 2–6 cm. wide, rounded or obtuse at the base, abruptly acuminate at the apex, subentire or inconspicuously remote-serrulate, very sparsely short strigose above, uniformly strigose-villose beneath. Flowers ternate, rarely solitary, or racemose with the subsequent pairs in the axils of normal leaves, the pedicels 3–7 mm. long, glabrous or sparsely villose; hypanthia and calyx sparsely villose; sepals ovate, 7–9 mm. long, 5–7 mm. wide, acuminate; corolla disciform 4–5 cm. across, the petals suborbicular, 2–2.5 cm. in diameter; stamens 80–90, the longest 1.5 cm. long, disc glabrous, the style 15 mm. long, the stigma oar-shaped, the abaxial surface definite, 1.5 mm. long; the adaxial surface 2 or 3 times longer, diminishing gradually. Capsules ellipsoid, 1 cm. long, 9 mm. in diameter, the persistent sepals supermedian. Seeds long-caudate.

UNITED STATES: Georgia: Floyd Co., near Rome, cliffs of Coosa River, Biltmore Herb. No. 11376, flowering specimen, collected on May 3, 1899 (TYPE, photo, A, NY); same number, fruiting specimen, collected on Sept. 22, 1902 (A, NY).

CULTIVATED: Europe: England: Hort. Cantab., Pl. Loddiges in 1849 (NY). Germany: Hort. Späth ex Herb. Dendr. Schneider (A). United States: Massachusetts: Hort. Bot. Cambridge, R. Cameron, June 7, 1918 (A); Hort. Dixwell, A. Rehder, June 24, 1903 (A). Canada: Dominion Arboretum and Botanic Garden, J. M. Gillett, July 3, 1939 (A).

Lindley in 1837 prepared an illustrated account about a plant which was grown in the garden of the London Royal Horticultural Society under the name *P. grandiflorus* and he named it as *P. speciosus* Schrader. Besides reprinting Schrader's original description he made no effort to characterize that plant. From his figures we know that his plant has pubescent hypanthia and calyx, a disciform corolla with suborbicular petals. As Schrader's *P. speciosus* has glabrous hypanthia and calyx, I judge that Lindley's specimen could not be Schrader's species. To ascertain the identity of the plant which Lindley called *P. speciosus* we have to turn to his discussion for some light. In the first paragraph of his discussion he admitted that "it is hardly possible to procure the species, as defined by Professor Schrader, with certainty from the nurseries, unless from Messrs. Loddiges." In the New York Botanical Garden collection there is a specimen labeled "*P. speciosus* e. pl. Loddige." This specimen has sparsely villose hypanthia and calyx. In the form and dentation of the leaves, in the type of inflorescences, in the size of the flower and in the shape of the corolla this specimen matches Lindley's illustrations perfectly.

There is no doubt that this element was what Lindley called *P. speciosus*. It is identical with the flowering type of *P. floridus* Beadle. In preparing volume 22 of the North American Flora, Rydberg had examined this specimen. He was correct in interpreting Lindley's *P. speciosus* and Beadle's *P. floridus* as conspecific. As stated above that which Lindley interpreted as *P. speciosus* was not Schrader's species. Beadle's binomial is the oldest for this taxon.

The earliest record of its cultivation in American gardens can be drawn from two collections made by A. Rehder on June 24, 1903 in the Dixwell Garden in Jamaica Plain, Mass. Later it was also cultivated in the now extinct Cambridge Botanical Garden. The later specimen was interpreted by Rehder as *P. magnificus*.

P. floridus Beadle is closely related to *P. inodorus* var. *grandiflorus* (Willd.) Gray. It can be distinguished from the latter taxon by the sparsely villose hypanthia and calyx, the uniformly strigose-villose lower leaf-surfaces and the rather frequent presence of a pair of flowers in the axils of normal leaves below the terminal ternate flowers. Those characters which distinguish it from *P. inodorus* var. *grandiflorus* are also characters which link its relationship to *P. pubescens* Loisel. It is perhaps a natural hybrid of the two. Geographically this species falls into the range of *P. inodorus* var. *grandiflorus*, but its occurrence is rare. It is only known in nature by the type collections.

There are two cultivated varieties which differ from the genuine *P. floridus* by their solitary flowers, denser pubescence and smaller leaves.

KEY TO THE VARIETIES OF *P. FLORIDUS*

- A. Leaves 4–5 cm. long, subentire or inconspicuously remote-serrulate; hypanthia sparsely strigose-villose, the underneath tissue visible; corolla cruciform 16a. var. *faxonii*.
- AA. Leaves 6–8 cm. long, prominently remote-denticulate; hypanthia densely strigose-villose, the underneath tissue obscure, corolla disciform 16b. var. *rehderiana*.
- 16a. *Philadelphus floridus* var. *faxonii* Rehd. in Jour. Arnold Arb. 1: 199. 1920; Man. Cult. Trees Shrubs 279. 1927; ed. 2, 273. 1940; et Bibliogr. Cult. Trees Shrubs 194. 1949.

TYPE: *C. E. Faxon*, June 28, 1907.

A graceful shrub, the bark castaneous, exfoliating; leaves elliptic, 2.5–5 cm. long, 1–2 cm. wide, obtuse or acute at the base, acuminate at the apex, subentire or faintly serrulate, glabrescent above, uniformly strigose beneath; flowers solitary or ternate, the hypanthia and calyx strigose-villose, the underneath tissue visible, the sepals ovate, 7 mm. long, 3 mm. wide, the corolla cruciform, 4 cm. across, the petals oblong, 1.8 cm. long, 1.5 cm. wide.

CULTIVATED: Boston, Mass. Hort. H. Chandler, *C. E. Faxon*, June 28, 1907 (A, TYPE); from the same plant, *C. E. Faxon*, June 16, 1911 (A).

This variety differs from typical *P. floridus* Beadle in having smaller leaves and cruciform corolla. In general appearance this variety resembles *P. inodorus* var. *laxus* (Schrader) S. Y. Hu. From the latter taxon it can readily be distinguished by its strigose-villose hypanthia and calyx. It is only known by collections made from the type plant. The Arnold Arboretum No. 10978 labeled as *P. floridus* var. *faxonii* is said to have been propagated through cuttings made from H. Chandler's garden. But the Arboretum Plant has completely glabrous hypanthia and calyx and disciform corolla with semidouble petals. It is not the genuine *P. floridus* var. *faxonii* Rehder.

16b. *Philadelphus floridus* var. *rehderianus*, var. nov.

Frutex 2 m. altus, ramis tenuibus, biennis castaneis, exfoliatis, hornotinis glabris; foliis ovatis 5–10 cm. longis, 2.5–5 cm. latis, basi acutis vel obtusis, apice acuminatis, supra sparse pilosis, subtus praesertim dense villosis, remote denticulatis; floribus solitariis, raro ternatis, pedicellis 3–8 mm. longis, dense villosis, hypanthiis calycibusque dense villosis, sepalis ovatis, 9 mm. longis, 5 mm. latis, corolla disciformi, 4–5 cm. diametro, petalis suborbicularibus, ca. 2 cm. diametro; staminibus ca. 90, 3–12 mm. longis; stylo cum stigmatibus 14 mm. longo; capsulis ellipsoideis, 10–11 mm. longis, 8–9 mm. diametro.

CULTIVATED: Arnold Arboretum No. 5311, *A. Rehder*, June 18, 1910 (TYPE, A); *C. E. Faxon*, June 14, 1911 (A), Oct. 3, 1916 (A); *C. K. Allen*, June 21, 1927 (A).

This very distinct form was introduced into cultivation through the Arnold Arboretum in 1906. It was raised from seeds collected from Highland, North Carolina by T. G. Harbison. In appearance it resembles *P. inodorus* var. *grandiflorus* f. *quadranguliflorus* S. Y. Hu. It can be readily distinguished from the latter form by its densely pubescent hypanthia and calyx and its uniformly dense pubescent lower leaf-surfaces.

The above cited specimens have been named by Rehder as *P. floridus*. The type of Beadle's species has very sparsely villose hypanthia and calyx and subentire or faintly serrulate leaves. The indumentum of the hypanthia and calyx of this variety resembles that of *P. pubescens* Loisel. It is dense and canescent. Its leaves have remote and prominent teeth. These differences are distinct enough to warrant it at least a varietal status.

Section 4. *Stenostigma* Koehne

Philadelphus subg. II. *Euphiladelphus* sect. 4. *Stenostigma* Koehne, emend.

Philadelphus Reihe 1. *Corticatae* Koehne, Deutsche Dendr. 179, 180, 1893.

Philadelphus Reihe 3. *Decorticatae racemosae* Koehne, op. cit. 180, 182.

Philadelphus sect. *Stenostigma* Koehne in Gartenfl. 45: 450. 1896; et in Mitt.

Deutsch. Dendr. Ges. 1904(13): 77, 81. 1904, pro parte. — Engler, Pflanzenf. ed. 2, 18a: 193. 1930, pro parte.

Philadelphus Coronarii Rydb. in N. Am. Fl. 22: 162. 1905, in clavi, s. stat.

TYPE SPECIES: *P. coronarius* Linn.

Erect shrubs with rather stiff branchlets, the bark exfoliating or closed; leaves ovate, dentate, rarely semi-entire; flowers in determinate racemes; sepals ovate; petals oblong, ovate or suborbicular; stamens 25 up to 38, rarely over 40; ovary with medianly attached placentas, the style usually divided above, the stigmas clavate, rarely spatulate or oar-shaped; capsules ellipsoid with subapical persistent sepals; seeds usually short-tailed, the lobes on the crown rounded (except some Himalayan and American species).

Geographically, this section has the widest range. Its species occur in every continent of the Northern Hemisphere. From the Ozark Plateau region northwestward to northwestern United States and the adjacent territory of Canada, and from the higher altitudes of northeastern Asia to Japan, Korea, China, the western Himalayan region, the Caucasus and southern Europe, its distribution forms a slightly discontinuous belt girdling the world. Morphologically, several of its very widely separated species such as *P. coronarius* of Europe, *P. triflorus* of the western Himalayan region, *P. tenuifolius* of northeastern Asia, *P. satsumi* of Japan and *P. lewisii* of northwestern United States are hard to distinguish. This is also true with *P. caucasicus* of the Caucasus, *P. subcanus* of Central China, *P. schrenkii* of northeastern Asia, *P. skikokianus* of Japan, and *P. gattingeri* of southeastern United States. The subdivisions of this section are here made more on the basis of geographical separations and less on morphological distinctions of the included species. They are series *Coronarii* of Europe and the Caucasus, *Tomentosi* of western Himalaya, *Delavayani* of southwestern China, *Sericanthi* of China and Korea, *Pekinenses* of north China, *Satsumani* of Japan, *Gordoniani* of northwestern United States, and *Pubescentes* of the interior low plateaus and the Ozark Plateau regions of the United States.

KEY TO THE SERIES

- A. Hypanthia glabrous or rarely with a few hairs at the base.
 - B. Adaxial stigmatic surface longer than the abaxial.
 - C. Seeds long-caudate, the embryos half as long as the tails (except *P. triflorus*).
 - D. Leaves glabrous or glabrescent; American species. Ser. 1. GORDONIANI.
 - DD. Leaves tomentose beneath; Himalayan species. Ser. 2. TOMENTOSI.
 - CC. Seeds medium- or short-caudate, the embryos equal to or longer than the tails.
 - D. Seeds short-caudate, the embryo longer than the tail (except *P. brachibotrys*); northern and eastern Chinese species. Ser. 3. PEKINENSES.

- DD. Seeds medium-caudate, the embryos equal to the tail; European and Caucasian species. Ser. 4. CORONARI.
- BB. Adaxial stigmatic surface shorter than the abaxial; southwestern Chinese species Ser. 5. DELAVAYANI.
- AA. Hypanthia uniformly and, in general, thickly pubescent.
- B. Large shrubs up to 4 or 5 m. high; the lower surfaces of the leaves, the hypanthia and sepals uniformly long villose; southeastern United States species. Ser. 6. PUBESCENTES.
- BB. Medium or low shrub, 1-3 m. high; the lower surfaces of the leaves, the hypanthia and sepals strigose or scabrid (except *P. mitsai* from northwest China).
- C. Seeds short-caudate; hair on the hypanthia strigose, scabrid or villose; Chinese species. Ser. 7. SERICANTHI.
- CC. Seeds long- or medium-caudate; hair on the hypanthia weak, short, golden, curly, only along the angles or very sparsely all over; Japanese species. Ser. 8. SATSUMANI.

Series 1. *Gordoniani* (Koehne) Rehder

Philadelphus subg. II. *Euphiladelphus* sect. 4. *Stenostigma* ser. 1. *Gordoniani* (Koehne) Rehder, Man. Cult. Trees Shrubs ed. 2, 266. 1940; et Bibl. Cult. Trees Shrubs 191. 1949.

Philadelphus sect. *Stenostigma* subsect. *Gordoniani* Koehne in Gartenfl. 45: 450. 1896; et in Mitt. Deutsch. Dendr. Ges. 1904(13): 77, 81. 1904, pro parte. — Engler, Pflanzenf. ed. 2, 18a: 193. 1930.

Philadelphus Coronarii Rydb. in N. Am. Fl. 22: 162. 1905, in clavi, s. stat., pro parte, non Koehne 1896.

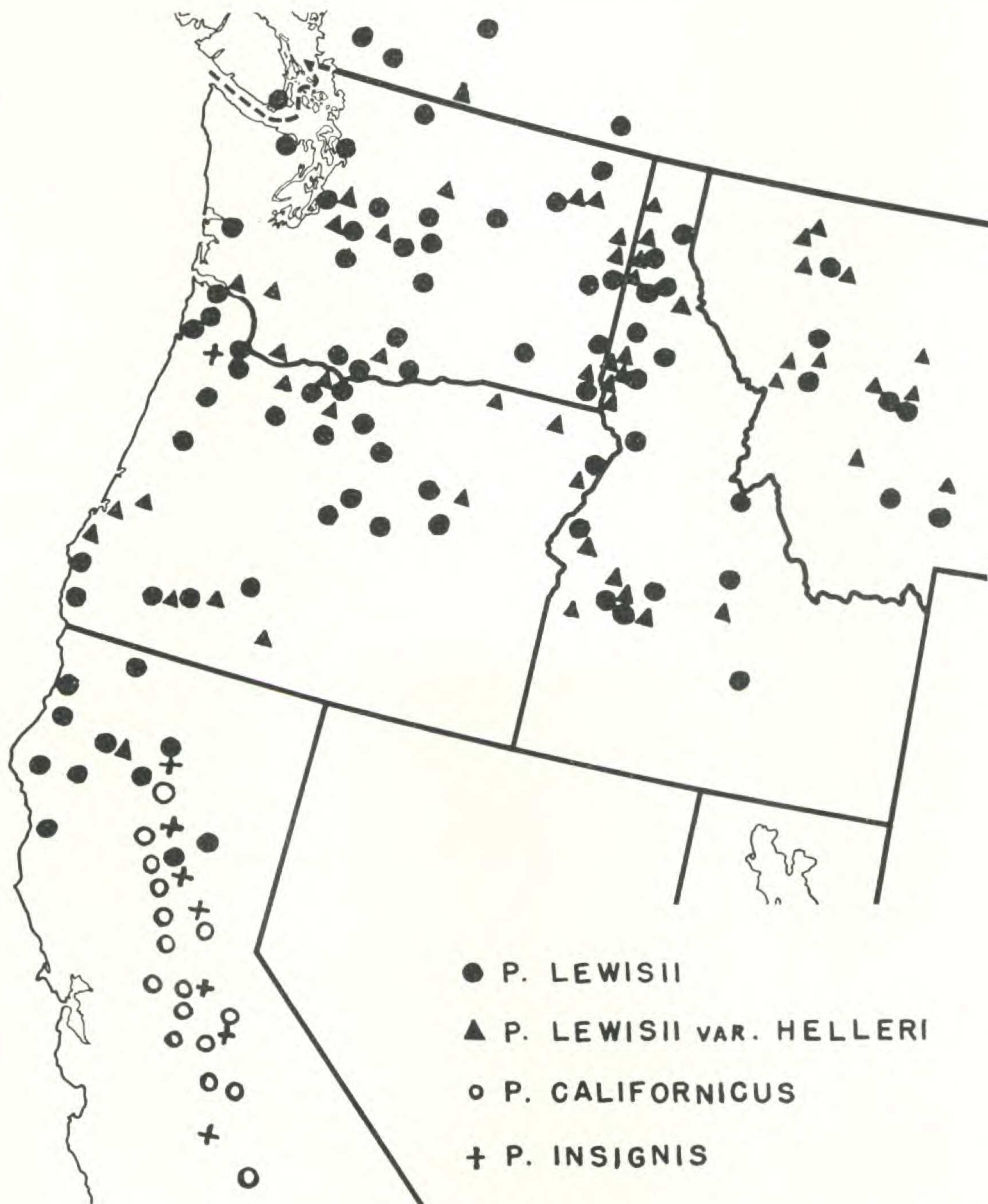
TYPE SPECIES: *P. lewisii* Pursh.

Large erect shrubs with brown or gray branchlets, the bark of the second year's growth generally closed; leaves denticulate or subentire; flowers with more or less glabrous hypanthia, the corolla usually cruciform; capsules ellipsoid with super medianly attached persistent sepals; seeds long-caudate. Four species, three in northwestern United States and adjacent Canada, and one in southern United States. Their distribution is shown in map 4.

KEY TO THE SPECIES

- A. Petals glabrous.
- B. Disc glabrous.
- C. Anthers glabrous.
- D. Bark of the second year's growth ochraceous, brown or castaneous; western species. 17. *P. lewisii*.
- DD. Bark of the second year's growth cinereous; southeastern species. 18. *P. intectus*.
- CC. Anthers hirtellous 19. *P. trichothecus*.
- BB. Disc pilose.
- C. Anthers glabrous; style glabrous, rim of the disk white setose. 20. *P. oreganus*.
- CC. Anthers hirtellous; style and disk pilose. 21. *P. confusus*.
- AA. Petals hirtellous on both surfaces. 22. *P. zelleri*.

17. *Philadelphus lewisii* Pursh, Fl. Am. Sept. 1: 329. 1814. — DC., Prodr. 3: 206. 1828. — Schrader in Linnaea 12: 401. 1838. — Hooker, Fl. Bor. Am. 1: 220. 1834. — Torr. & Gray, Fl. N. Am. 1: 595. 1840. — Koch in Woch. Gärt. Pflanz. 2: 229. 1859. — Gray in Bot. Calif. 1: 202. 1876. — Dippel, Handb. Laubh. 3: 344, fig. 181. 1893. — Nicholson, Kew Hand-list 1: 227. 1894, ed. 2, 377. 1902. — Koehne, Deutsche Dendr. 180. 1893; in Gartenfl. 45: 541. 1896; et in Mitt. Deutsch. Dendr. Ges. 1904 (13): 81. 1904. — Schneider, Ill. Handb. Laubh. 1: 368, fig. 237, s-u. 1905. — Rydb.



MAP 4. The distribution of the species of *Philadelphus* in western United States.

in N. Am. Fl. 22: 165. 1905. — Howell, Fl. Northw. Am. 206. 1898. — Rehder, Man. Cult. Trees Shrubs 272. 1927, ed. 2, 266. 1940; et Bibl. Cult. Trees Shrubs 191. 1949. — Abrams, Ill. Fl. Pac. St. 2: 384, fig. 2304. 1944. — Bean, Trees Shrubs, ed. 7, 2: 636. 1950; et in Chitt. Dict. Gard. 3: 1546. 1951.

Philadelphus globosus hort. ex Koch, Dendr. 344. 1869.

Philadelphus thyrsiflorus Hort. ex Nicholson, Kew Hand-list 1: 227. 1894; ed. 2, 377. 1902, in syn.

Philadelphus coronarius nivalis Hort. ex Nicholson, Kew Hand-list 227. 1894; ed. 2, 377. 1902, in syn.

Philadelphus nivalis Hort. ex Nicholson, ll.cc., in syn, non Jacques, 1841.

An erect shrub up to 3 m. high, the branchlets rather stiff, the second year's growth brown, rarely ochraceous or castaneous, the bark closed, with transverse cracks, slowing wearing off; current year's growth glabrous, ciliate at the nodes, buds enclosed. Leaves ovate, 4–5.5 cm. long, 2–3.5 cm. wide, rounded at the base, acute, rarely obtuse or short-acuminate at the apex, semi-entire or inconspicuously denticulate, sparsely strigose-villose on the nerves above, barbate in the nerve angles and strigose-villose on the nerves beneath, ciliate on the margins. Inflorescences 7-, 9-, or 11-flowered, rarely on weak branchlets 5-flowered, or flowers ternate or solitary, the rachis sparsely pilose or glabrescent; pedicels 2–7 mm. long, sparsely pilose, the lower ones always in the axils of normal leaves; hypanthia campanulate, glabrous; sepals ovate, 5–6 mm. long, 3 mm. wide at the base, the apex acute or acuminate; corolla cruciform, 3–4.5 cm. across, the petals oblong, 13–22 mm. long, 6–10 mm. wide, the apex rounded and emarginate; stamens 28 up to 35, the longest about half the length of the petals, the anthers oblong, glabrous; disc glabrous, the style shorter than the longer stamens, glabrous, undivided or slightly divided above, the abaxial stigmatic surface 0.5–1.8 mm. long, the adaxial surface twice as long or even longer. Capsules ellipsoid, 7–10 mm. long, 4–5 mm. in diameter, pointed at both ends, the persistent calyx super-median. Seeds long-caudate, the embryo cylindrical, 0.75 mm. long, the tail equal or twice as long, the crown with pointed lobes.

CANADA: British Columbia: Vancouver Island, Victoria, W. R. Carter, July 7, 1917 (G), Aug. 21, 1917 (G); J. Macoun, July 2, 1887 (MO, NY), Aug. 31, 1877 (NY); C. F. Newcomber, Aug. 14, 1916 (G), 328 (F); Fraser Valley, Fletcher, June 1885 (G); Sproat, Columbia River, J. Macoun, June 27, 1890 (US); Salmo, F. A. MacFadden 13915 (NY); Chilliwack Valley, J. Macoun, Aug. 16, 1901 (G, NY); Lake Osoyoos, J. Macoun, June 3, 1905 (F, NY).

UNITED STATES: Washington: Asotin Co., C. E. Skinner 116 (F); Chelan Co., Leavenworth, I. C. Otis 955 (US), J. W. Thompson 6734 (G), L. M. Umbach 482 (NY); Lake Chelan, M. Kelly 4 (MO); Douglas Co., Grand Coulee, E. Mackay 17 (G, MO, NY, US); Moses Coulee, W. C. & M. W. Muenscher 11253 (CU); Ferry Co., Colville Nat. Forest, W. W. Eggleston 10614 (US); King Co., Seattle, L. Benson 1154 (US), G. Engelman & C. S. Sargent, July 18,

1880 (A), *W. J. Eyerdam* (F), *J. G. Jack*, Aug. 18, 1904 (A), *S. M. Zeller*, Aug. 8, 1910 (MO); Kittitas Co., Rock Island, *J. H. Sandberg & J. B. Leiberg* 452 (G, NY, US); Klickitat Co., *W. N. Suksdorf* 1740 (A), 6921 (A), 7011 (A); Mt. Constitution, *H. C. Cowles* 382 (F); Olga, *C. C. Engberg*, June 19, 1905 (NY); Pierce Co., *Wiegand, Castle, Dann & Douglas* 1119 (F); San Juan Island, *C. A. Reynold* 28 (F); Spokane Co., Clark Springs, *F. O. Kreager* 598 (G, NY, US); Spangle, *W. N. Suksdorf* 300 (G); Trout Lake, Mount Rainier Forest Reserve, *J. B. Flett*, July 27, 1899 (US); Walla Walla Co., Blue Mts., *C. V. Piper*, Aug. 2, 1892 (G); same locality, *C. S. Sargent*, Aug. 1, 1896 (A); Walla Walla, *C. L. Shear* 5605 (US); Whatcom Co., *W. C. Muenscher* 7956 (G, CU); Whitman Co., Palouse, *J. G. Jack* 1294 (A); Yakima, *T. S. Brandegee* (A); same locality, *D. Griffiths & J. S. Cotton* 43 (NY, US). Oregon: Lewis River, *Lewis* (fragment of TYPE, NY); Benton Co., Brook Lane, *H. M. Gilkey*, June 16, 1943 (G); Clackamas Co., Milwaukie, *W. N. Suksdorf* 940 (A); Columbia Co., Goble, bank of Columbia River, *A. Rehder*, Aug. 22, 1904 (A); Cow Canyon Co., Madras, *M. E. Peck* 15773 (MO); Crook Co., *F. V. Coville & E. I. Applegate* 712 (A, US); same county, without precise locality, Herb. Iowa State College no. 268 (G, MO); Farewell Bend, *J. B. Leiberg* 475 (A, F, G, NY, US); Crook River, *K. Whited* 208a (A); Curry Co., *M. E. Peck* 8829 (BH, G, MO); Dalles of the Columbia River, *G. Engelmann & C. S. Sargent*, Aug. 25, 1880 (A); The Dalles, *J. W. Thompson* 2822 (MO); Farmington, *J. E. Kirkwood* 203 (NY); Forest Grove, *F. E. Lloyd*, Oct. 1849 (NY); Fort Colville to Rocky Mts., *Dr. Lyall* (G); Grant Co., Canon City, *H. E. Brown* 83 (A, MO, NY, US); Grant's Pass, *H. S. Prescott*, May 15, 1912 (G), June 8, 1912 (F); Hood River Co., *L. F. Henderson* 9207 (G, MO); E. Independence, *J. C. Nelson* 1562 (G); Jackson Co., *E. I. Applegate* 2195 (US); Josephine Co., *W. H. Camp* 49 (NY); Klamath Co., Keno, *M. E. Peck* 9418 (G, NY); Multnomah Co., Bridal Veil, *H. H. Smith* 3111 (F); Mount Hood, *H. D. Langille* in 1898 (US); Portland, *E. P. Sheldon* 12087 (F); same locality, *M. W. Gorman* 412 (US), *J. W. Thompson* 845 (MO), *L. S. Rose* 37434 (MO); Sauvie's Island, *H. F. Munroe*, June 1875 (F); Shemman Co., John Day Valley, *L. F. Henderson* 5405 (G, MO); Trail Creek Cañon, *E. P. Sheldon* 8207 (A, G, MO, NY, US); Union Co., *W. C. Cusick*, June–July 1876 (G); *J. W. Thompson* 4847 (MO); Wallowa Co., Wallowa, *M. E. Peck* 18420 (NY); Wallowa Lake, *L. Constance & C. J. Jacobs* 1416 (MO); Snake River Canyon, *Constance, Rollins, & Dillon* 1570 (G); Imnaha, *W. C. & M. W. Muenscher* 15860 (CU); Wasco Co., Hood River, *A. A. Heller* 10098 (A, G, MO, US), *E. P. Sheldon* S 12173 (F); N. W. Wheeler Co., Pine Creek, *M. E. Peck* 10051 (A, NY); without precise localities, *E. Hall* 167 (G, MO, NY), *T. J. Howell* (F), *R. D. Nevins* in 1873 (G). California: Del Norte Co., *Ruth & B. C. Maguire* 15162 (CU); Humboldt Co., Yager Road, *S. K. Harris* 3529 (G), 3530 (G); Plumas Co., *A. A. Heller* 15130 (US); Siskiyou Co., *E. E. Stanford* 1601 (MO); Trinity Co., Weaverville, *J. P. Harrington* (US); *C. Epling & W. Robison*, June 20, 1935 (MO); Yreka, *E. L. Greene*, June 24, 1876 (F, MO); without precise localities, *J. M. Bigelow* in Whipple's Exploration for a Railway Route in 1853–4 (US), *A. Kellogg & W. G. W. Harford* 247 (G, NY, US). Idaho: Boise Co., Boise, *J. A. Clark* 72 (BH, G, US), 319 (BH, G); same locality, *T. E. Wilcox* in June 1881 (G), *C. L. Hitchcock & C. V. Muhlick* 9759; Sweet, *J. F. Macbride* 1623 (F, G, MO, NY, US); Custer Co., Bear Creek, *J. F. Macbride & E. B. Payson* 3369 (G); Lake Coeur d'Alene, *Ruth & B. C. Maguire*, June 12, 1934 (CU); Pend d'Oreille, *E. L. Greene*, Aug. 8, 1889; Coeur d'Alene Mts., Carbon, *J. B. Leiberg* 1515 (US); Kootenai Co., Hope, *A. A.*

Heller 253 (F); same locality, *E. A. Mearns*, June 13, 1903 (US), *J. B. Leiberger*, July 1890 (F), July 1892 (F), *J. H. Sandberg*, July 1888 (US); Latah Co., Cedar Mt., *C. V. Piper*, July 19, 1901 (G); Clearwater River, *C. English Jr.* (BH); Viola, *D. E. Elmer* 79 (NY, US); Lemhi Co., Salmon, *E. B. & L. B. Payson* 1869 (BH, G, MO, NY); Nez Perces Co., Hatwai Creek, *Sandberg, MacDougal & Heller* 253 (CU, G, NY, US); Clearwater River, *F. G. Meyer* 879 (G); Washington Co., *M. E. Jones* 6305 (MO); without precise locality, *T. E. Wilcox* in 1883 (US). M o n t a n a : Flathead Co., Big Fork, *B. T. Butler* 2117 (NY), 2294 (NY); same locality, *L. M. Umbach*, Aug. 11, 1901 (NY); Galatin Cañon, *J. W. Blankinship* 172 (F, US); Glacier National Park, *B. Maguire & G. Piranian* 15529 (G); Helena, *F. D. Kelsey*, June 20, 1887 (F), June 1890 (F), July 7, 1891 (F, G); Kalispell, *S. D. McKelvey*, Sept. 18, 1921 (A); Lake McDonald, *H. M. Evans*, July 16, 1924 (F); Madison Co., Pony, *P. A. Rydberg & E. A. Bessey* 4317 (F, G, NY, US); Missoula, *J. E. Kirkwood* 1151 (F, G); Bridger Mts., *W. W. Jones*, July 1905 (G); Ravalle, *C. Riss*, June 17, 1888 (A); Swan Lake, *H. N. Whitford* 18 (F); Sixteen Mile Creek, *W. M. Canby* 52b (US); without precise locality, *W. J. Howard s.n.* (G).

CULTIVATED: Europe: Kew, A. 19, *Macklearn* 429 (BH); Hort. Bot. Berol., *E. Koehne* 218 (G); Hort. Götting., *A. Rehder* 1654 (A); Plantières, *C. Schneider*, Sept. 1903 (A). United States: Arnold Arboretum 543-4 = 5876 (A), 543-5 = 15370 (A), 1004-30 (A).

This species was described on the basis of Lewis' collection made "on the Waters of Clark's River." This locality was interpreted by Piper¹ as the "Hellgate River, between Missoula, Mont., and the mouth of Big Blackfoot River, in Missoula county, Montana," and by Rydberg² as the "Clark's Fork of Columbia River in Montana." The label which accompanied the fragment of the type in the New York Botanical Garden gives the type locality as "Oregon, Lewis River."

Since the publication of *P. lewisii* Pursh, several binomials have been established on the strength of the pubescence of the leaves, the color of the bark of the stem, the degree of division of the style, or the shape of the apex of the sepals. The large amount of material that I have examined clearly demonstrates that none of these characters is constant and that they are unreliable for distinguishing species. The type of *P. lewisii* Pursh is a fruiting specimen. Its leaves are rather small, 2.5-4 × 1.3-2.2 cm., acute at the apex, sparsely pubescent above, and also on the nerves and in the nerve angles beneath. The apices of the persistent sepals on the fruit are acute. A large number of the specimens that match with the type in these respects have oblong petals and cruciform corollas. This character is also interpreted as typical of *P. lewisii* Pursh in this study. Specimens with obovate petals and disciform corollas are considered as a variety of *P. lewisii* Pursh. The wild populations of this species do exhibit definite patterns in the size and form of the leaves. These are treated as different forms of the typical *P. lewisii* Pursh.

Philadelphus lewisii has a wide range, from British Columbia down the Pacific coastal states to California and eastward to Montana and Idaho.

¹ C. V. PIPER, New and noteworthy plants, in Bull. Torrey Bot. Club 29: 226. 1902.

² P. A. RYDBERG, Hydrangeaceae, in North American Flora 22: 165. 1902.

In this large area it tolerates greatly varied ecological conditions. In Victoria it grows in lowland woods. In Washington it has been collected in the rocky draws among the sagebrushes. In Oregon it is found to be common in thickets, on the banks of rivers, on bluffs and in canyons. It has also been observed to grow in grassy openings associated with *Berberis* and *Quercus* in the cutover *Pseudotsuga* groves. In Idaho it occurs on cliffs and rock slides at altitudes of 900–1830 meters. Normally it grows from two up to three meters high, and its white, slightly fragrant flowers appear from late May to early July.

Although *Philadelphus lewisii* is a native of the United States, when compared with the other species cultivated in the American gardens, it is a very rare plant in this country. So far as I know, the few specimens existing in the outstanding American arboretums and botanical gardens are imported, with only one exception, from European nurseries. For example, Arnold Arboretum 5876 was imported in 1909 from the Späth nursery, and 543–5 was from Simon Louis nursery. In 1930 E. J. Palmer moved a living plant from Wolf Creek of Montana to the Arnold Arboretum (1004–30). It flowered in 1936, but has not done well in New England.

KEY TO THE VARIETIES OF *P. lewisii*

- A. Hypanthia completely glabrous.
 - B. Base of the leaf rounded; lamina ovate or oblong, 2–5 cm. wide (except var. *parvifolius*).
 - C. Leaves subcoriaceous, those on the flowering branches subentire or inconspicuously denticulate, the length equal to or longer than twice the width.
 - D. Petals obovate, the corolla disciform; leaves ovate or oblong-ovate.
 - E. Leaves on the flowering branches 4–6 cm. long. a. var. *gordonianus*.
 - EE. Leaves on the flowering branches 1–2 cm. long. b. var. *parvifolius*.
 - DD. Petals oblong, the corolla cruciform; leaves oblong. c. var. *oblongifolius*.
 - CC. Leaves chartaceous, suborbicular or broad ovate, those on the flowering shoot usually dentate or serrate, the length less than twice the width. d. var. *platyphyllus*.
 - BB. Base of the leaf acute; lamina lanceolate, 6–14 mm. wide. e. var. *angustifolius*.
 - AA. Hypanthia with few hairs.
 - B. Leaves ovate or oblong, the base rounded.
 - C. Lamina 3–8 cm. long. f. var. *helleri*.
 - CC. Lamina 1.5–2.5 cm. long. g. var. *intermedius*.
 - BB. Leaves elliptic, the base acute or obtuse. h. var. *ellipticus*.
- 17a. *Philadelphus lewisii* var. *gordonianus* (Lindl.) Jepson, Man. Fl. Pl. Calif. 466. 1925. — McMinn, Ill. Man. Cal. Shrubs 139, fig. 136. 1939.

Philadelphus gordonianus Lindl. in Bot. Reg. 24 (Misc. Not.): 21. 1838; 25: pl. 32, 1839. — Torr. & Gray, Fl. N. Am. 1: 595. 1840. — Walp., Repert. 2: 151. 1843. — Gray, Bot. Calif. 1: 202. 1849. — Decaisne & Naudin, Man. Amat. Jard. 3: 69, fig. 19. 1868. — Lavallée, Arb. Segrez. Enum. 116. 1877. — Nicholson, Ill. Dict. Gard. 3: 95, fig. 7. 1886. — Rattan, Pop. Cal. Fl. 57. 1879, ed. 8, rev. 57. 1892. — Dippel, Handb. Laubh. 3: 342. 1893. — Koehne in Gartenfl. 45: 542. 1896. — Rydb. in N. Am. Fl. 22: 167. 1905. — Gordon in Jour. Roy. Hort. Soc. London 34: 12, fig. 6. 1908. — Mottet, Arbres Arb. Orn. Pleine Terre 224. 1925. — Rehder, Man. Cult. Trees Shrubs 272. 1927, ed. 2, 267. 1940; et Bibl. Cult. Trees Shrubs 191. 1949. — Gilkey, Handb. Northw. Fl. Pl. 147, fig. [1]. 1942. — Abrams, Ill. Fl. Pac. St. 2: 384, fig. 2303. 1944. — Bean, Trees Shrubs ed. 7, 2: 413. 1950; et in Chitt., Dict. Gard. 3: 1546. 1951.

Philadelphus cordatus Petzold & Kirchner, Arb. Muscav. 203. 1864.

Philadelphus grahami Petzold & Kirchner, l.c.

Philadelphus californicus sensu Carrière in Rev. Hort. 1866: 339. 1866, non Benth.

Philadelphus lewisii sensu Piper in Bull. Torr. Bot. Club 29: 225. 1902, non Pursh.

Philadelphus gordonianus var. *columbianus* (Koehne) Rehder in Jour. Arnold Arb. 1: 196. 1919; Man. Cult. Trees Shrubs 272. 1927, ed. 2, 267. 1940; et Bibl. Cult. Trees Shrubs 191. 1949.

Philadelphus columbianus Koehne in Gartenfl. 44: 542. 1896. — Rydb. in N. Am. Fl. 22: 166. 1905. — Schneider, Ill. Handb. Laubh. 1: 368, fig. 236, k. 1905.

TYPE: Cult. London Hort. Soc., July 9, 1838 (ISOTYPE, G).

An erect shrub; the leaves ovate, those of the vegetative shoots 5–6 cm. long, 2.5–4 cm. wide, uniformly sparsely pubescent beneath, glabrous and inconspicuously pilose along the nerves above, coarsely dentate, each side with 4 or 5 large outward pointing teeth in the middle, rounded at the base, shortly acuminate at the apex; the leaves on the flowering branch ovate, 3–5 cm. long, 1.5–3.5 cm. wide, subentire or minutely serrulate, glabrous on both surfaces, except the nerves inconspicuously pilose; hypanthia and sepals glabrous; corolla disciform, 3.5–4.5 cm. across, the petals obovate, 1.5–2 cm. long, 1.2–1.9 cm. wide, rounded at the apex; stamens ca. 35; capsules ellipsoid, 10 mm. long, 4 mm. in diameter.

UNITED STATES: Washington: W. Klickitat Co., W. N. Suksdorf, June 14, 1881 (US); Walla Walla Co., L. O. Anderson, June 8, 1883 (BH). Oregon: Curry Co., Rogue River near Elk Creek, J. B. Leiberger 4181 (US); Crook Co., Blue Mountains, W. W. Eggleston 11378 (US); Wallowa Co., near Wallowa, A. W. Sampson & G. A. Pearson 79 (US); without precise locality, T. J. Howell, July 1880 (US). California: Mendocino Co., Round Valley, V. K. Chestnut 119 (US). Montana: Big Fork, B. T. Butler 2117 (NY).

CULTIVATED: Europe: London Hort. Soc., Lindley, July 9, 1838 (G, specimen from the TYPE plant); Hort. Bot. Berl., E. Koehne 9 (ISOTYPE of *P. columbianus* Koehne, G); Hannover, Bot. Gart. Forstakademie, H. Zabel 2 (BH), 13 (BH); Breslau, C. Baenitz, July 4, 1899 (A), June 27, 1907 (A, BH). Canada: Ottawa, Dominion Arboretum 97–485–1, M. N. Zinck 1566 (BH).

United States: Arnold Arboretum 4619 = 2221-4, A. Rehder, June 24, 1909 (A). New York, Rochester, Highland Park, Mrs. R. E. Horsey, Sept. 21, 1917 (BH), June 16, 1918 (BH).

Philadelphus gordonianus Lindl. was described on the basis of a living specimen raised from the seed sent to London by Douglas. A specimen collected from the type plant on July 9, 1838, is preserved in excellent condition in the Gray Herbarium. The leaves on the vegetative shoots of this specimen are pubescent and coarsely dentate. Those on the flowering shoot are subentire and glabrous. In the indumentum on the leaf-surfaces and the dentation along the margin this specimen does not differ from the typical *P. lewisii* Pursh. Nevertheless, the petals of its large flowers are broad obovate and the corolla more or less disciform. This specimen and the spontaneous material that matches with it in the disciform corolla are treated as a variety of *P. lewisii* Pursh, a species characterized by cruciform flowers. In this variety there is a considerable variation in the color of the bark of the second year's growth. The bark of the type plant is castaneous and tardily exfoliate, that of the Oregon and Montana material is reddish brown and closed, and that of the specimens from Washington and California is gray and closed. Judging from the material I have examined, this variety is very rare in American gardens.

17b. *Philadelphus lewisii* var. *parvifolius*, var. nov.

Frutex parvus, ramis cinereis, bienniis castaneis, 2-3 mm. diametro, transverse rimulosis, hornotinis glabris, ad nodos ciliatis; foliis parvis, ovatis vel oblongo-ovatis, 1-2 cm. longis, 5-8 mm. latis, utrinque obtusis, raro basi rotundatis, integerrimis ciliatisque, supra glabris vel sparse pilosis, subtus glabris et in axillis nervorum barbatis; inflorescentiis 3- vel 5- raro 1-floris, rhachibus 5-10 mm. longis, pedicellis pilosis, hypanthiis glabris; sepalis ovatis, acutis; corolla disciformi, 1.5-2 mm. diametro, petalis oblongo-obovatis, 7-10 mm. longis, 5-8 mm. latis, apice rotundatis, staminibus ca. 30; disco glabro, stylo 5 mm. longo, $\frac{1}{3}$ - $\frac{1}{2}$ diviso, stigmatibus clavatis; capsulis ignotis.

UNITED STATES: M o n t a n a : Missoula, J. E. Kirkwood 1151 (TYPE, F; fragment A; MO, ISOTYPE); Helena, B. T. Butler 865 (NY).

This variety is distinguished by its small habit, entire, oblong-ovate leaves and small, very much crowded flowers. In appearance it reminds one of the hybrid *P. lemoinei*, but this hybrid and its various forms all have pubescent, broad-ovate, serrate, or elliptic-lanceolate leaves. The type of this variety was collected in the prairie of Missoula. Mr. M. Canoso of the Gray Herbarium knows that country well, and he assures me that it is a spontaneous plant. Doubtlessly it is closely related to Nelson's *P. intermedius*, but the original description of the latter calls for broad-ovate, short-petiolate, or sessile leaves and "foliose-bracted" flowers. Nelson cited no specimens. My material which fits his description has sparsely puberulous hypanthia.

17c. *Philadelphus lewisii* var. *oblongifolius*, var. nov.

A typo recedit foliis oblongis vel oblongo-ellipticis, 4–6.5 cm. longis, 1.3–3 cm. latis, utrinque obtusis vel interdum apice acutis, integris vel raro inconspicuis crenatis; hypanthiis glabris, sepalis ovato-lanceolatis; corolla disciformi, 3–4 cm. diametro, petalis oblongis, 1.5–2 cm. longis, 1 cm. latis, apice erosis, subrotundatis; disco et stylo glabris.

UNITED STATES: Washington: Chelan Co., Wenatchee, *K. Whited* 143 (US), 1175 (US); Whitman Co., Wawawai, *C. V. Piper* 3838 (G, NY; US, TYPE); Seattle, *C. A. Mosier* (US); Yakima region, North Fork, *J. Cotton* 465 (US); Rattlesnake Mountain, *J. Cotton* 674 (G, US). Oregon: Jackson Co., Wimer, *E. W. Hammond* 123 (US). California: Humboldt Co., Valley of the Van Duzen River, *J. P. Tracy* 2886 (US); Hupa Indian Reservation, *H. P. Chandler* 1333 (G, NY, US).

This variety is distinguished from the typical *P. lewisii* by its oblong or oblong-elliptic leaves with obtuse bases. Its flowers are large, and its introduction into cultivation is desirable.

17d. *Philadelphus lewisii* var. *platyphyllus* (Rydb.), comb. nov.

Philadelphus platyphyllus Rydb. in N. Am. Fl. 22: 167. 1905.

Philadelphus gordonianus sensu Abrams, Ill. Fl. Pax. St. 2: 384. 1944, pro parte, non Lindl.

TYPE: California, Mt. Shasta, *H. E. Brown* 562 (NY).

Bark of the second year's growth gray, closed, the current year's growth glabrous; leaves broad elliptic or suborbicular, rarely ovate, 4.5–7 cm. long, 2.5–5 cm. wide, rounded at the base, acute at the apex, coarsely dentate or subentire, glabrous or rarely sparsely pilose above, bearded and more or less glabrous beneath; inflorescences 5-, 7-, or 9-flowered, the lower pairs in the axils of normal leaves; pedicels, hypanthium and calyx glabrous, the sepals ovate-elliptic, 6 mm. long, 3 mm. wide; corolla cruciform, 3.7–4.5 cm. across, the petals oblong-obovate, rounded at the apex; stamens ca. 38, the longest 7–9 mm. long; disc and style glabrous, the latter 4 mm. long, the stigma oar-shaped.

UNITED STATES: Washington: Cape Horn, *C. V. Piper* 5031 (G, US); Klickitat Co., *W. N. Suksdorf* 6641 (NY), 6922 (NY). California: Siskiyou Co., south side of Mt. Shasta, *H. E. Brown* 562 (NY, TYPE; US, ISOTYPE); Trinity Co., *W. H. Brewer*, 1864 (US); without precise locality, *A. Kellogg & W. G. W. Harford* 247 (NY). Idaho: without precise locality, *F. V. Coville & T. H. Kearney Jr.* 234 (US). Montana: Big Fork, *B. T. Butler* 547 (NY).

This variety can be distinguished from the typical *P. lewisii* Pursh and other related forms by its large, broad-elliptic or suborbicular, chartaceous leaves. Rydberg considered it a species. As there is no essential difference between this taxon and *P. lewisii* Pursh other than the texture and general appearance of the leaves, I think it warrants no higher rank than a variety.

Rydberg recorded the type as *Brown* 561. But the type material de-

posited in the New York Botanical Garden, as well as the isotypes in the United States National Herbarium, all have the number 562 on the labels. This discrepancy is apparently a clerical error.

17e. *Philadelphus lewisii* var. *angustifolius* (Rydb.), comb. nov.

Philadelphus angustifolius Rydb. in N. Am. Fl. 22: 166. 1905.

Philadelphus gordonianus sensu Abrams, Ill. Fl. Pac. St. 2: 384. 1944, pro parte, non Lindl.

TYPE: Washington, *Mrs. Bailey Willis*, in 1883 (NY).

Bark of the second year's growth castaneous, exfoliate or tardily exfoliate, the current year's growth sparsely pilose; leaves lanceolate, 3–4.5 cm. long, 6–14 cm. wide, acute at the base, shortly acuminate at the apex, glabrous (except the nerves) on both surfaces, subentire or inconspicuously serrulate with one or two teeth on each side; inflorescences, 5-, 7- or rarely 9-flowered, the lower pairs in the axils of normal leaves; hypanthium and calyx glabrous; corolla cruciform, 3 cm. across, the petals oblong, 1.3 cm. long, 5–7 mm. wide, the apex rounded; disc and style glabrous, the stigma oar-shaped.

UNITED STATES: Washington: Palace Camp, *Mrs. Bailey Willis*, in 1883 (NY, TYPE); Tacoma, *Mrs. Bailey Willis*, in 1883 (NY).

This narrow-leaved variety is known only from the type collection. It is very distinct because of its lanceolate leaves. As the width of the leaves is regarded as an insufficient specific character for the northwestern American *Philadelphus*, this taxon is treated as a variety of *P. lewisii* Pursh.

17f. *Philadelphus lewisii* var. *helleri* (Rydb.), comb. nov.

Philadelphus helleri Rydb. in N. Am. Fl. 22: 166. 1905.

TYPE: Idaho: *A. A. & Gertrude Heller* 3374 (NY).

Bark of the second year's growth brown, castaneous, or cinereous, closed with transverse cracks, the current year's growth sparsely pilose, glabrescent; leaves oblong-ovate or ovate, glabrous or along the nerves or near the base sparsely pilose, 3–6 cm. long, 1.5–2.8 cm. wide, rounded at the base, acute or rarely obtuse at the apex, subentire or inconspicuously serrulate; inflorescences 7- or 9-, rarely 5-flowered, the lowermost pair in the axils of normal leaves; hypanthium and sometimes the calyx sparsely pilose; corolla cruciform, 3–4 cm. across, the petals oblong, the apex obtuse or rounded; disc and style glabrous.

CANADA: British Columbia: Gale, *G. Engelmann & C. S. Sargent*, July 23, 1880 (A); between Cascade and Rossland, *J. W. Thompson* 14415 (A, MO, NY); Oliver, *O. J. Murie* 1189 (MO); Nelson, *J. Fletcher* 621 (MO).

UNITED STATES: Washington: Asotin Co., bank of Snake River, *C. L. Hitchcock et al.* 8367 (BH, G); Chehalis Co., Satsop, *A. A. & G. Heller*

4023 (F, G, US); Chelan Co., *E. A. Purer* 7790 (MO); Cowlitz Co., *F. V. Coville* 703 (US); Ferry Co., Boulder Creek, *W. W. Eggleston* 10621 (US); King Co., *Savage, Cameron & Lenocker*, June–July 1898 (F); *C. A. Mosier*, June 8, 1892 (US); Kittitas Co., *A. D. E. Elmer* 380 (NY, MO, US); Ellensburg, *K. Whited* 518 (US), *J. W. Thompson* 6721 (G, MO); Muckleshute Prairie, *Dr. Ruhn* (F, G); Palouse, *J. G. Jack* 1367 (A, US); Spokane Co., *Dr. Holmes* 966 (NY, US), *J. G. Jack* 1402 (A), 1418 (A), 1457 (A, US), *C. V. Piper* (NY); without precise locality, *G. R. Vasey* 349 (G). Oregon: Columbia River banks, *H. V. Edward*, July 1873 (NY); Blue Mountain Springs near Prairie City, *M. E. Peck* 10318 (A); Coos Co., *W. Hayon* in 1911 (F); Columbia Co., Goble, *J. G. Jack*, Aug. 22, 1904 (A); Dayville, *W. E. Lawrence* 1014 (US); Hood River, *C. S. Sargent*, Aug. 14, 1896 (A); Jackson Co., *C. L. Hitchcock & J. S. Martin* 4983 (NY), *E. W. Hammond* 123 (MO); Klamath Co., *E. R. Kalmbach* in 1939 (US); Minam River, *E. P. Sheldon* 9047 (A, NY, US); Multnomah Co., *J. Howell*, June 1879 (A); Wallowa Co., Imnaha National Forest, *F. V. Coville* 2416 (US); Imnaha, *M. E. Peck* 17657 (NY); Wallowa Lake, *C. L. Shear* 5612 (US); Wasco Co., Cow Canyon, *F. V. Coville & E. I. Applegate* 675 (US); data on localities not clear, *W. C. Cusick* 106 (F), *J. Howell* in 1880 (US); *J. T. Jardine* 65 (US). California: Along Eel River, *B. Davy & W. C. Blasdale* 5547 (US); without precise locality, *G. R. Vasey* in 1875 (US). Idaho: Boise Co., *Muhlick* 9759 (NY); bank of Boise River, *J. A. Clarke* 319 (F, MO); *C. N. Woods & I. Tidestrom* 2586 (US); Bay Horse, *L. F. Henderson* 3795 (US), *J. S. Newberry*, Aug. 1881 (NY); Canyon Co., Big Willow, *J. F. Macbride* 102 (G, MO, NY, US); Lake Coeur d'Alene, Capse, *G. B. Aiton* 3091 (NY, US); Coeur d'Alene, *H. J. Ruth* 125 (US); Idaho Co., Salmon River, *W. C. & W. W. Muenscher* 15414 (CU); Kootenai Co., St. Maries, *H. D. House* 4927 (US); Latah Co., Moscow, *L. Abrams* 839 (A); *J. G. Jack* 1287 (A), 1289 (A), *M. Murley* 1734 (NY); Nez Perces Co., Lake Waha, *A. A. & G. Heller* 3347 (NY, TYPE; F, MO, ISOTYPES); Hatwai Creek, *Sandberg, MacDougal & Heller* 253 (G, NY, PARATYPES of *P. confusus* Piper); Nez Perces Reservation, Lewiston, *A. A. Heller*, May–June 1892 (F); same locality, *L. F. Henderson* in 1894 (US); without precise locality, *J. H. Sandberg*, June 1892 (G, NY); Priest Lake, *D. T. MacDougal* 175 (NY); Shoup, *J. F. Kemp* 65 (NY); Shoshone Co., *E. J. Palmer* 37804 (A, MO); Washington Co., Ruth Creek, *M. E. Jones* 6305 (NY); without precise locality, *G. Ainslie* in 1874 (US). Montana: Bear Gulch, *E. W. Scheuber*, July 17, 1901 (F, NY); Beartown, *E. Scheuber*, July 18, 1901 (NY); Beaverhead Co., Pioneer Range, *C. L. Hitchcock & C. V. Muhlick* 13026 (BH, MO); Flathead Co., Big Fork, *B. T. Butler* 7026 (NY); Columbia Falls, *J. G. Jack* 1575 (A), *S. D. McKelvey*, Sept. 20, 1921 (A); Flathead Lake and vicinity, *Mrs. J. Clemens* (F), *H. T. & J. M. Roger* 1056 (MO, NY); Gallatin Co., Gallatin Cañon, *F. Tweedy* 1261 (NY); Granite Co., *C. L. Hitchcock & C. V. Muhlick* 14414 (MO); Lewis & Clark Co., Wolf Creek, *E. J. Palmer* 36963 (A, MO, NY, US); Lake St. Marz, *S. D. McKelvey*, Sept. 9, 1921 (A); Lost Horse, *J. B. Leiberg* 2918 (US); Missoula Co., Flackfoot, *W. G. Chapman* 26 (NY); Missoula, *C. L. Hitchcock & C. V. Muhlick* 9090 (NY); Head of Jocko River, *C. S. Sargent*, July 15, 1883 (A); The Lo-Lo, *M. J. Elrod* 127 (MO, NY), Lolo National Forest, *E. J. Palmer* 37770 (NY, MO, US); Mission Mts., *D. T. MacDougal* 526 (NY, US); Ravali Co., *C. L. Hitchcock & C. V. Muhlick* 14520 (MO); Silver Bow Co., *F. Tweedy* 66 (NY); Swan Lake, *J. G. Jack* 2376 (A); Tenderfoot, *R. S. Williams*, July 31, 1891 (NY).

CULTIVATED: Europe: Hort. Göttingen, *A. Rehder* 402 (A). Canada: Ottawa, Dominion Arboretum 09-147-2, *J. M. Gillett* 7131 (A), 7133 (BH). United States: Arnold Arboretum 543, without collector, July 4, 1890 (A), Sept. 19, 1890 (A), June 29, 1910 (A); same stock, *W. N. Manning* in 1923 (BH); Arnold Arboretum 543-3 = 5876, without collector, June 30, 1913 (A); Arnold Arboretum, *E. J. Palmer*, June 18, 1936 (A). Washington, D.C., *G. R. Vasey*, June 4, 1879 (US). Rochester, Highland Park, *Mrs. R. E. Horsey*, June 17, 1918 (BH), Sept. 4, 1918 (BH).

This variety differs from typical *P. lewisii* Pursh only in the presence of some hairs on the hypanthium and calyx. It is more commonly met with in American gardens than the typical *P. lewisii*. Besides the stocks imported from European nurseries in the late 1800's, it was independently transplanted from California to Washington by Vasey and from Montana to the Arnold Arboretum by Palmer.

17g. *Philadelphus lewisii* var. *intermedius* (Nelson), stat. nov.

Philadelphus intermedius Nelson in Bot. Gaz. 42: 53. 1906.

LECTOTYPE: Idaho, *J. F. Macbride & E. B. Payson* 3037 (US).

Bark of the second year's growth castaneous, closed, transversely rimulose, tardily wearing off; the current year's growth sparsely weak villose, later glabrescent; leaves broad ovate, 1.5-2.5 (rarely up to 3 cm.) long, 8-15 (rarely up to 22 mm.) wide, rounded at the base, acute or obtuse at the apex, entire or faintly denticulate with one or two teeth on each side, hirtellous on both surfaces or glabrescent; inflorescences 3-, 5-, rarely 7- or 9-flowered, the lower pairs in the axils of normal leaves; hypanthia and sepals sparsely pilose; corolla subdisciform, 2.5 cm. across, the petals ovate, 9-10 mm. long, 7-8 mm. wide, the apex rounded; stamens ca. 35; disc and style glabrous.

UNITED STATES: Oregon: Wallowa Co., Jim Creek, *E. P. Sheldon* 8283 (A, NY). Idaho: Blaine Co., Martin, *J. F. Macbride & E. B. Payson* 3037 (US, LECTOTYPE; MO). Montana: Bitterroot Valley, *S. Watson* 138 (G, US).

When Nelson published *P. intermedius*, he cited no specimen. According to his description his taxon represents a small-leaved form with broadly oval to ovate, shortly petiolate or subsessile leaves rounded at the base, and foliose-bracted flowers. *Macbride & Payson* 3037 seems to fit that description best. This collection has sparsely pilose hypanthia and calyces. It is selected to represent the type of this small-leaved pubescent variety.

17h. *Philadelphus lewisii* var. *ellipticus*, var. nov.

Frutex, ramulis brunneis, hornotinis sparse pilosis, glabrescentibus; foliis ellipticis 4-7 cm. longis, 2-3.5 cm. latis, utrinque acutis, raro apice breviter acuminatis, chartaceis, subintegris vel remote inconspicuo-denticulatis, supra glabris raro sparse pilosis, subtus ad nervos strigoso-pilosis, barbatis; inflorescentiis, 5-, 7-, raro 9-floris; hypanthiis sparse pilosis;

sepalis ovatis, 4–6 mm. longis, acutis vel acuminatis; corolla cruciformi, 3.5 cm. diametro, petalis oblongis, 14–16 mm. longis, 7 mm. latis, glabris; staminibus ca. 30, antheris glabris; disco et stylo glabro.

CANADA: British Columbia: Vancouver Island, Saanichton, *I. Mounce*, July 7, 1939 (NY); Victoria, *J. Macoun* 231 (G, NY, US), 86468 (NY).

UNITED STATES: Washington: Chelan Co., Wenatchee Mountains, *J. W. Thompson* (A, G); Klickitat Co., Major Creek, *W. N. Suksdorf* 1741 (A); Spokane Co., N. Spokane, *J. G. Jack* 1456 (A), *F. O. Kreager* 31 (G, NY, US); Wahkiakum Co., Altoona, *W. N. Suksdorf* 6815 (A); Wawawai, Snake River, *E. R. Lake*, July 4, 1892 (F, US). Oregon: Birch Bay, *Dr. Holmes*, in 1838–42 (NY, US); Douglas Co., *L. F. Ward* 56 (NY, US); Grant Co., Grant's Pass, *Munson Hopkins*, Aug. 31, 1889 (US); Jackson Co., Walker Creek, *E. I. Applegate* 2341 (US); Klamath Co., *F. V. Coville & E. I. Applegate* 269 (A, TYPE; US, ISOTYPE); Klamath Falls, *E. I. Applegate* 184 (G, US); Spencer Creek, *E. I. Applegate* 2085 (US); Klamath Indian Reservation, *F. V. Coville* 1522 (US); Lake Chalan, *M. W. Gorman* 628 (US); Portland, *F. A. Walpole* 272 (US); Umatilla Co., Pilot Rock, *W. W. Eggleston* 12671 (US). California: Humboldt Co. or Mendocino Co., *H. N. Bolander* (G, US); Laytonville, *A. Eastwood* 9308 (BH); Fieldbrook, *J. P. Tracy* 8646 (A); Trinity Co., *L. Benson* 2194 (MO, NY, US). Idaho: Benton Co., Priest River, *C. C. Epling* 7929 (US); Coeur d'Alene Mountains, Clark's Fork, *J. B. Leiberg* 1666 (US); Nez Perces Co., *W. W. Eggleston & H. St. John* 21991 (US). Montana: Columbia Falls, *J. G. Jack* 2419 (A), *R. S. Williams* 678 (US); Flathead Lake, *M. C. Jones* 8370 (US).

18. ***Philadelphus intectus*** Beadle in *Biltm. Bot. Stud.* 1: 160. 1902. — Koehne in *Mitt. Deutsch. Dendr. Ges.* 1904 (13): 82. 1904. — Rydb. in *N. Am. Fl.* 22: 167. 1905. — Schneider, *Ill. Handb. Laubh.* 1: 368. 1905. — Beadle in *Small, Fl.* 507. 1903, ed. 2, 507. 1913; et in *Small, Man. South. Fl.* 599. 1933.

Philadelphus pubescens var. *intectus* (Beadle) A. H. Moore in *Rhodora* 17: 123. 1915. — Rehder, *Man. Cult. Trees Shrubs* 273. 1927, ed. 2, 267. 1940; et *Bibl. Cult. Trees Shrubs* 191. 1949.

Philadelphus sanguineus Hort. ex Nicholson, *Kew Hand-list* ed. 2, 377. 1902, in syn.

TYPE: Tennessee, Nashville, Biltmore Herb. 11378 (photo & fragment A, NY).

An erect tall shrub up to 5 m. high, the branches cinereous, the second year's growth 3–4 mm. in diameter, the bark closed, the current year's growth glabrous, the nodes not ciliate. Leaves ovate or oblong-elliptic, those on the vegetative shoot 6–9.5 cm. long, 4–6 cm. wide, those on the flowering shoot 3–6 cm. long, 1.5–3.5 cm. wide, rounded or obtuse at the base, acuminate at the apex, the acumen 5–10 mm. long, glabrous on both surfaces, remotely and finely serrulate along the apical half of the margin, ciliate; petioles 4–7 mm. long, sparsely ciliate. Inflorescences 5-, 7-, or 9-flowered, the lower pairs in the axils of normal leaves; pedicels 4–6 mm.

long, glabrous; hypanthia campanulate, glabrous; sepals ovate, 6 mm. long, caudate at the apex; corolla disciform, 3 cm. across, the petals oblong-obovate, 15 mm. long, 12 mm. wide, the apex rounded and erose; stamens ca. 38; disc and style glabrous, stigmas spatulate, the adaxial surface three times longer than the abaxial. Capsules subglobose ellipsoid, 5–7 mm. long, 4–5 mm. in diameter, the persistent calyx subapical. Seeds medium- or long-caudate, the embryo 1.25 mm. long, the tail as long or a little shorter.

UNITED STATES: Kentucky: Lyon Co., Kuttawa, W. W. Eggleston 4544 (NY). Tennessee: Nashville, Bluff of the Cumberland, Biltmore Herb. 11378 (fragment and photo of TYPE, A, NY), 11378c (TOPOTYPE, NY); same locality, C. D. Beadle, June 1899 (A, very likely an ISOTYPE), T. G. Harbison 67 (A). Oklahoma: Le Flore Co., Page, E. J. Palmer 21623 (A, NY, US).

CULTIVATED: Europe: Villa Thuret, May 30, 1889; Hort. Bot. Berol. 10, E. Koehne, June 19, 1894 (G), July 10, 1895 (G), Sept. 3, 1894 (G). United States: Arnold Arboretum 4454, without collector, Sept. 10, 1913 (A); 4454–2, A. Rehder, July 18, 1918 (A); 539–6 = 15339, without collector, June 30, 1913 (A), Sept. 10, 1913 (A), same number, A. Rehder, July 1, 1916 (A); 15358, E. J. Palmer, June 11, 1936 (A), 15376, C. K. Allen, June 21, 1927 (A); 1052–36, E. J. Palmer, Oct. 3, 1940 (A), June 24, 1943 (A).

Philadelphus intectus Beadle was described on the basis of a specimen collected on the bluffs of the Cumberland River below Nashville. Beadle's detailed description portrays the type exactly. Its completely glabrous leaves and hypanthia suggest a close relationship with *P. lewisii* Pursh. Its stiff upright tall habit and its ovate or oblong-elliptic leaves resemble those of *P. pubescens* Lois. Moore maintained that the differences between *P. pubescens* Lois. and *P. intectus* Beadle are comparable to those between *P. coronarius* Linn. and *P. tomentosus* Wall. As he accepted the combination *P. coronarius* var. *tomentosus* (Wall.) Hook. f. & Thom., he also established the trinomial *P. pubescens* var. *intectus* (Beadle) Moore. Rehder differs from Moore in keeping *P. coronarius* Linn. and *P. tomentosus* Wall. as distinct species but accepted Moore's interpretation of treating *P. intectus* Beadle as a variety of *P. pubescens* Lois. As there is actually a closer tie between *P. intectus* Beadle and *P. lewisii* Pursh than between the former and *P. pubescens* Lois., I can see no justification in keeping it as a variety of the last-named species.

Philadelphus intectus was introduced into cultivation long before it was properly named. Villa Thuret received seeds from C. S. Sargent labeled *P. hirsutus* in the 1880's. In the Botanical Garden of Berlin a plant interpreted by Koehne as *P. gordonianus* was under cultivation before the 1890's. The same taxon was distributed by the Späth and other nurseries as *P. "sanguineus"* and *P. "latifolius verrucosus."* In the United States specimens represented by these trade names were introduced by the Arnold Arboretum around 1910, and they were numbered in the field 4454–2 and 539–6. Meanwhile in the Cambridge Botanical Garden a plant of the same

species was cultivated under the name *P. hirsutus*. Cuttings from this plant were planted in the Arnold Arboretum under the field number 15358. It is very likely that both the European stock and the Cambridge planting of this species were introduced into cultivation by Gattinger, who practiced medicine in eastern Tennessee in the late 1800's and botanized that area very extensively. Some of his collections of a vegetatively similar species were labeled and distributed in outstanding American herbaria as *P. hirsutus*. Again in 1905 T. G. Harbison went to the type locality to collect specimens and seeds for the Arnold Arboretum. Specimen number 4454 was raised from Harbison's seeds.

18a. *Philadelphus intectus* var. *pubigerus*, var. nov.

Frutex altus, ramulis cinereis vel plumbeis, hornotinis glabris; foliis ovatis vel ellipticis, supra glabris vel glabrescentibus, subtus uniforme strigoso-villosis, subintegris vel utrinque 1 vel 2 dentibus minutis; inflorescentiis 7- vel 9-floribus, paribus inferioribus in axillis foliorum positis; hypanthiis sepalisque glaberrimis, capsulis obovoideo-ellipsoideis; seminibus longicaudatis.

UNITED STATES: Arkansas: Baxter Co., Norfolk, *D. Demaree* 3071 (MO, US); Garland Co., Hot Springs, *E. J. Palmer* 26870 (A, MO); Le Flore Co., Page, *E. J. Palmer* 22623A (A, TYPE); Logan Co., Magazine Mountain, *D. Demaree* 17727 (MO), 21320 (NY); Marion Co., Rush, *E. J. Palmer* 6033 (A, MO); Pope Co., London, *H. E. Wheeler*, May 10, 1922 (F); Van Buren Co., Shirley, *E. J. Palmer* 25202 (A, MO).

This variety is distinguished from the typical *P. intectus* Beadle by its pubescent leaves. In this respect it resembles *P. pubescens* Lois., but the latter species has pubescent hypanthia. Besides this morphological differentiation existing between this pubescent variety and the typical glabrous *P. intectus*, there is also a geographical separation between them. *Philadelphus intectus* was discovered on the steep rocky slopes and bluffs of the Cumberland River, and its present range is in the interior low plateau region, principally in the Nashville Basin and the Lexington Plain. *Philadelphus intectus* var. *pubigerus* is restricted to the interior highland region. It occurs on the rim of bluffs on the top of Magazine Mountain or on the rocky bluffs of the Ouachita River. Geographically it is more closely associated with *P. pubescens* than with *P. intectus*. Morphologically it serves as a link between these two species and a bridge between the *Gordoniani* series of the northwestern states and the *Pubescentes* series of the southeastern states of the United States.

19. *Philadelphus trichothecus*, sp. nov.

Frutex erectus, ramulis brunneis, bienniis 2–3.5 mm. diametro, cortice clauso, hornotinis strigoso-pilosis; foliis ovatis vel oblongo-ellipticis, 3–7 cm., raro usque 8.5 cm. longis, 1–3 cm. latis, basi rotundatis vel obtusis, apice breve acuminatis, acutis vel raro obtusis, supra ad nervos pilosis, aliter glabris, subtus barbatis et ad nervos strigoso-pilosis, subintegris vel

utrinque 2- usque 6-dentatis; inflorescentiis 5-, 7-, raro 3-floribus, bracteis foliaceis; hypanthiis sparse pilosis, sepalis ovato-oblongis, 8 mm. longis, basi 3.5 mm. latis, apice caudatis; corolla cruciformi, 3-4.5 cm. diametro, petalis oblongis, 17-20 mm. longis, 8-10 mm. latis, glabris; staminibus ca. 30, antheris hirsutis; disco et stylo glabris; capsulis obovoideis, 7 mm. longis, 6 mm. diametro; seminibus ignotis.

CANADA: British Columbia: Vancouver Island, Victoria, Oak Bay, *W. R. Carter* (G, TYPE); Fraser River at Hope, *C. L. Hitchcock & J. S. Martin* 7361 (MO, NY).

UNITED STATES: Washington: Ferry Co., Columbia River below Kettle Falls, *H. T. Roger* 558 (G, MO, NY); Klickitat Co., Bingen, *W. N. Suksdorf* 3704 (A); Mt. Constitution, *H. C. Cowles* 382 (G); Whatcom Co., *W. C. & W. W. Muenscher* 5430 (BH). Oregon: Clear Water, *Rev. Spalding*, May 28 (G); Portland, *F. A. Walpole* 2 (US); Oneonta Tunnel, *J. W. Thompson* 4710 (MO, US), Wasco Co., near Rice Station, *W. E. Lawrence* 122 (BH). California: Humboldt Co., Willow Creek, *L. R. Abrams* 7200 (NY); Siskiyou Co., *G. D. Butler* 1558 (MO, US); Trinity Co., Weaverville, *J. P. Harrington*, June 2, 1928 (US). Idaho: Boise River, *A. I. Mulford*, July 1892 (NY); Nez Perces Co., *J. H. Sandberg*, June 1892 (G); Capse, *G. B. Aiton* (MO). Montana: Garnet Co., *Mrs. E. W. Scheuber* 193 (F, NY, US).

CULTIVATED: Arnold Arboretum 22652, *R. B. Clark*, June 19, 1941 (BH).

Both in leaf form and in the sparsely pilose hypanthia this species resembles *P. lewisii* var. *helleri* (Rydb.) S. Y. Hu, but it can readily be distinguished from the latter taxon by its hirsute anthers.

20. *Philadelphus oreganus* Nuttall ex Torr. & Gray, Fl. N. Am. 1: 595. 1840, in syn., *nomen nudum*.

Philadelphus gordonianus sensu Torr. & Gray, l.c., pro parte, quoad spec. Nuttall, non Lindley.

TYPE: Oregon woods, *Nuttall* (G).

Frutex erectus, ramulis brunneis, bienniis 3-4 mm. diametro, cortice clauso, hornotinis sparse pilosis, glabrescentibus; foliis late ellipticis, ovato-ellipticis vel ovatis, 5-8 cm. longis, 2-4.5 cm. latis, basi obtusis vel rotundatis, apice obtusis vel acutis, subintegris, supra sparse strigoso-pilosis, subtus praeter nervos glabris; inflorescentiis 7-, 9- vel 11-floribus, paribus inferioribus in axillis foliorum compositis, pedicellis 3-5 mm. longis, glabris; hypanthiis sparse pilosis; sepalis ovatis, 7 mm. longis, apice acuminatis; corolla cruciformi, 3.5 cm. diametro, petalis oblongis, apice rotundatis, 1.5 cm. longis, 1 cm. latis; staminibus ca. 35; margine disci solis vel disco et stylo pilosis; capsulis ellipsoideis, 7 mm. longis, 5 mm. diametro; seminibus longicaudatis.

UNITED STATES: Oregon: Portland, *A. Eastwood* 1132 (A); Oregon woods, *Nuttall* (G, TYPE; NY, ISOTYPE). California: Humboldt Co., Arcata, *A. A. Heller* 13776 (MO, NY, US); Dyerville, *H. H. Smith* 3928 (F, G,

NY, US); Trinity Co., Rush Creek, *H. S. Yates* in June 1914 (US). Idaho: Lake Pend d'Oreille, *E. L. Greene*, Aug. 8, 1889 (US).

21. *Philadelphus confusus* Piper, Bull. Torr. Bot. Club 29: 225. 1902. —Koehne in Mitt. Deutsch. Dendr. Ges. 1904 (13): 81. 1904. —Schneider, Ill. Handb. Laubh. 1: 367. 1905. —Rydb. in N. Am. Fl. 22: 166. 1905. —Rehder, Man. Cult. Trees Shrubs 272. 1927, ed. 2, 267. 1940; et Bibl. Cult. Trees Shrubs 191. 1949.

TYPE: Washington, Tum-Tum Mountain, *O. D. Allen* 221 (G).

An erect shrub, the second year's growth brown, 2–4 mm. in diameter, the bark closed, with few transverse cracks, the current year's growth glabrous, ciliate at the nodes. Leaves ovate-elliptic, 4–7 cm. long, 2–3 cm. wide, obtuse at both ends, subentire, glabrous on both surfaces except the principal nerves. Inflorescences 5-, 7-, rarely 3-flowered, the lower pairs in the axils of normal leaves; hypanthia subglobose, glabrous, the sepals ovate, 5–6 mm. long, acute at the apex; corolla cruciform, 2.5 cm. across, the petals oblong, 15 mm. long, 6 mm. wide, glabrous, the apex rounded; stamens ca. 25, anthers hirtellous at the base; disc sparsely pilose, style very short, with the stigmas 4 mm. long, spatulate. Capsules broad-ellipsoid, 6–8 mm. long, 5–6 mm. in diameter, the persistent calyx supermedian. Seeds long-caudate, the embryo cylindrical, 0.75 mm. long, the tail slightly longer.

UNITED STATES: Washington: King Co., Issaquah, *J. W. Thompson* 10522 (A, MO); Cascade Mountains, *Dr. Lyall* 1859 (G); Tum-Tum Mountain, *O. D. Allen* 221 (G, TYPE; A, MO, NY, US, ISOTYPES). California: Humboldt Co., Yager Road, *S. K. Harris* 3529 (G); *H. H. Smith* 3928 (G, MO). Idaho: Latah Co., Moscow, *M. Murley* 1734 (MO).

It is fitting to call this species *P. confusus*. There is no strong character to warrant it a distinct species, yet it is hard to amalgamate it with the other known species. It was described on the basis of three collections, namely, *Allen* 221 from Washington, *Sandberg, Heller and McDougal* 253 from Idaho, and *Brown*, July 16, 1896, from Oregon. Brown's collection, with its glabrous hypanthium, disk and anthers, is typical *P. lewisii* Pursh. *Sandberg, Heller and McDougal* 253 represents a mixture of fruiting and flowering material collected from different places as well as on various occasions. Some specimens of this number are *P. lewisii* and others are *P. lewisii* var. *helleri*. *Allen* 221 was designated as the type of the species. A year after the publication of the species, on the sheet deposited in the Gray Herbarium, Piper wrote, "This I made the type of *confusus* relying principally on the style character. I now regard this as unreliable and think the leaf pubescence furnishes on the whole the best distinction between *gordonianus* and *lewisii*. Dentation, style and bark characters seem to me more inconstant." Thus Piper invalidated his species. Rydberg and Rehder accepted this species, distinguishing it from *P. lewisii* by its yellowish or gray closed bark and acute sepals. Again these are variable characters. By employing a good binocular, hairs are observed on the style,

disk, and anthers of the type material. This suggests its relationship with *P. oreganus* Nutt., which has a pubescent disc, and *P. trichothecus* S. Y. Hu, which has hirtellous anthers.

22. *Philadelphus zelleri*, sp. nov.

Frutex erectus, ramulis brunneis, bienniis 3 mm. diametro, cortice clauso, hornotinis sparse villosis; foliis ovato-ellipticis, 3–6 cm. longis, 1.5–3 cm. latis, basi obtusis, rotundatis vel acutis, apice acutis vel breviter acuminatis, utrinque praeter nervos glabris; inflorescentiis 7- vel 9-floribus; hypanthiis calycibusque sparse pilosis; sepalis ovatis, 5–6 mm. longis, apice acutis; corolla cruciformi, 3–5 cm. diametro, petalis obovatis, utrinque hirtellis, 16–18 mm. longis, 9–10 mm. latis, apice erosis; staminibus ca. 35, antheris hirtellis; disco et stylo sparse pilosis; capsulis ignotis.

UNITED STATES: Washington: San Juan Island, Friday Harbor, S. M. & E. B. Zeller 974 (US, TYPE; fragment, A).

This is a very strange specimen. Of all the northwestern American material I have examined, this is the only one which has hirtellous petals. Its hirtellous anthers suggest a close relationship with *P. trichothecus* S. Y. Hu, but it can easily be distinguished from the latter species by its pubescent petals.

Series 2. *Tomentosi*, ser. nov.

Philadelphus subg. II. *Euphiladelphus* sect. 4. *Stenostigma* ser. 2. *Tomentosi*, ser. nov.

Philadelphus sect. *Stenostigma* subsect. *Satsumani* Koehne in Gartenfl. 45: 451, 561. 1896; et in Mitt. Deutsch. Dendr. Ges. 1904 (13): 82. 1904, pro parte.

Philadelphus sect. *Coronarii* (Koehne) Nakai in Bot. Mag. Tokyo 29: 64. 1915, pro parte.

Philadelphus ser. *Coronarii* (Koehne) Rehder, Man. Cult. Trees Shrubs ed. 2, 269. 1940; et Bibl. Cult. Trees Shrubs 192. 1949, pro parte.

TYPE SPECIES: *P. tomentosus* Wall. ex G. Don.

Frutices erecti, foliis ovatis, apice caudatis vel acuminatis, acumine 1.5–2.5 cm. longo, floribus racemosis, paribus inferioribus in axillis foliorum positis; corolla parva, 2–3 cm. diametro; staminibus 25 usque 38; stylo $\frac{1}{3}$ – $\frac{1}{2}$ diviso, faciebus stigmatum ventralibus saepe fissis; capsulis ellipsoideis vel obovoideis; caudis seminum brevibus vel elongatis.

This series is isolated in a small area of the western Himalayan region between Long. 77–79° E. and Lat. 30–33° N. There is no geographical isolation among the three included species. They all occur along the roads on the forested slopes at altitudes of 2000 to 3000 meters.

KEY TO THE SPECIES

A. Style glabrous.

B. Leaves tomentose beneath; seeds with long tails; hypanthia often with

- few weak caducous villose hairs. 23. *P. tomentosus*.
 BB. Leaves glabrous beneath; seeds with short tails; hypanthia glabrous.
 24. *P. triflorus*.
 AA. Style pubescent. 25. *P. lancifolius*.

23. **Philadelphus tomentosus** Wall., Num. List, No. 3653. 1831, *nom. nud.* — G. Don, Syst. 2: 807. 1832, *descr.* — Royle, Ill. Bot. Himal. 1: 215. 1835; 2: *pl.* 46, *fig.* 1, 1839. — Loudon, Arb. Frut. Brit. 2: 955. 1838. — Walp., Repert. 2: 151. 1843. — Dippel, Handb. Laubh. 3: 338, *fig.* 177. 1893. — Koehne, Deutsche Dendr. 182. 1893; in Gartenfl. 45: 562. 1896; et in Mitt. Deutsch. Dendr. Ges. 1904 (13): 84. 1904. — Schneider, Ill. Handb. Laubh. 1: 371, *fig.* 237c–e. 1905. — Osmaston, For. Fl. Kumaon 230. 1927. — Rehder, Man. Cult. Trees Shrubs 275. 1927, ed. 2, 270. 1940; et Bibl. Cult. Trees Shrubs 192. 1949. — Engler, Pflanzenf. ed. 2, 18a: 194. 1930. — Bean, Trees Shrubs ed. 7, 2: 420. 1950; et in Chitt., Dict Gard. 3: 1547. 1951.

Philadelphus nepalensis Wall. ex Loud., Hort. Brit. 196. 1830, *nom. nud.* — (*P. nipaulensis*) G. Don, Gen. Syst. 2: 807. 1832, in syn.

Philadelphus coronarius var. *tomentosus* Hook. f. et Thom. in Jour. Linn. Soc. Bot. 2: 83. 1857. — Maxim. in Mém. Acad. Sci. St. Pétersb. VII. 10 (16): 41 (Rev. Hydr. As. Orient. 41). 1867. — Clarke in Hook. f., Fl. Brit. Ind. 2: 407. 1878.

TYPE: *Wallich 3653A* (*Thomson* from Gassain, Kew).

Shrub 2–3 m. high, bark of second year's growth cinnamon, tardily exfoliating; current year's growth glabrous or glabrescent, 1.5–2 mm. in diameter. Leaves ovate, rarely lanceolate, 4–10 cm. long, 2–5 cm. wide, rounded or obtuse at the base, caudate at the apex, the acumen 1.5–2.5 cm. long, 5- or 7-nerved, glabrescent above, uniformly villose beneath, the trichomes compressed. Inflorescences pseudoracemose, 5- or 7-, rarely 3-flowered, the lower pairs usually in the axils of normal leaves, bracts to the terminal flowers often leafy, linear or lanceolate, up to 4 cm. long, 1 cm. wide, rather persistent; pedicels 6–11 mm. long, villose, hypanthium and calyx more or less glabrous, often with weak caducous villose hairs; sepals ovate, 5 mm. long, 3 mm. wide, acuminate; corolla cruciform, 1.5–2.5 cm. across, the petals obovate-oblong, 0.5–1 cm. long, 5–8 mm. wide; stamens about 25, the longest 8 mm. long; disk glabrous, the style 7 mm. long, the upper one third divided, the stigma clavate, the abaxial surface definite, 1–1.5 mm. long, the adaxial surface 3 or 4 times longer, often split at the middle. Capsule ellipsoid, 1 cm. long, 6–7 mm. in diameter, the persistent sepals supermedian. Seeds with medium-long tails.

INDIA: Chamba State: Camba Range, *R. N. Parker*, June 6, 1919 (A); Pangi, June 1919 (A); Alwas, *R. R. Steward* 2512 (A, NY). Garhwal: Panikhanada, Phagti, *A. E. Osmaston* 382 (A); same area, *H. Falconer* 470 (G, NY). Siwalik & Jaunsar Divisions: *Chakrata Amar Chand* 44 (NY). Kumaon: *R. Strachey & J. E. Winterbottom*, C (G). Kulu Himalaya: Puling, *W. Koelz* 284 (NY). Himal. Bor. Occ. Regio

Temp.: *T. Thomson*, alt. 7–10,000 ft. (G, NY); *T. Thomson*, alt. 6–9000 ft., A (G).

CULTIVATED: Europe: Kew, *G. Nicholson* 1317. United States: Arnold Arboretum nos. 15419 (= 2482–2 — from Germany), 4785 (from Kew), 15422 (4785–3) (all in A).

One of the Thomson collections and the Strachey and Winterbottom collection both represent mixtures of different elements in the Gray Herbarium. On the Thomson sheet there are two specimens. "A" represents a shoot with three fruits. Its leaves are tomentose and it belongs to this species. "B" is a flowering specimen of *P. triflorus* Wall. Its leaves are glabrous beneath, except the principal nerves, which are sparsely villose. The Strachey & Winterbottom sheet has three elements. A is a fruiting specimen. B and C are flowering specimens. The lower surface of the leaves of A and B is glabrous, except the principal nerves, beneath. They are *P. triflorus* Wall.

Philadelphus tomentosus Wall. was established on the basis of three collections from Gassain, Simore, and Kumaon of the western Himalayan region. It was validated by G. Don's description published in 1832. According to this description, the species has ovate acuminate leaves which are tomentose beneath. I have not seen the syntype. Among the more recent collections, the specimens that fit Don's description in the leaf character all have more or less glabrous hypanthia, low stamen count, glabrous disk and style, clavate stigma with the abaxial surface often split, ellipsoid fruit, and long-tailed seeds.

Philadelphus tomentosus Wall. is restricted to the western Himalayan region. Koehne in 1904 recorded it from Japan. There is some mistake in his identification. In the western Himalayan region the plants occur generally in shady forests at altitudes of 2100–2800 meters. The white, fragrant flowers appear in May in some areas and in June or July in other places.

According to Loudon, *P. tomentosus* Wall. was introduced into cultivation in 1822. It is a species with comparatively small flowers. Among the cultivated examples I have seen material prepared from the Arnold Arboretum, Kew, Hort. Plantières, Hort. Les Barres, Hort. Späth, etc. According to my understanding of the species, only the material from the first two institutions is true to the type of the species.

24. *Philadelphus triflorus* Wall., Num. List 3653. 1831, *nomen nudum*. — Royle, Ill. Bot. Him. 1: 215. 1835, *nomen subnudum*. — Loudon, Arb. Frut. Brit. 2: 955. 1838, in syn. — Koch in Wochenschr. Gärtner. Pfl. 2: 228. 1859, in syn.

Philadelphus nepalensis Koehne, Dendr. 183. 1893; in Gartenfl. 45: 618. 1896; et in Mitt. Deutsch. Dendr. Ges. 1904 (13): 85. 1904. — Schneider, Ill. Handb. Laubh. 1: 373, fig. 238g. 1905. — Rehder, Man. Cult. Trees Shrubs 276. 1927; ed. 2, 270. 1940; et Bibl. Cult. Trees Shrubs 192. 1949, non Wall. ex Loudon 1830.

TYPE: *Wallich 3653B* (Kew).

Erect shrub, bark of the second year's growth light brown, tardily exfoliating, the current year's growth glabrous. Leaves ovate, 6–9 cm. long, 3–5 cm. wide, rounded or obtuse at the base, caudate at the apex, the acumen 15–25 mm. long, glabrous above, entirely glabrous or the principal nerves sparsely pubescent beneath. Inflorescences racemose, 5- or rarely 3- or 7-flowered, the lower pairs in the axils of the normal leaves, the bracts of the terminal flowers linear or narrow-lanceolate, up to 3 cm. long, 4 mm. wide; pedicels (5–) 10–15 mm. long, glabrous or glabrescent; hypanthium and calyx glabrous; sepals ovate, 5 mm. long, 3 mm. wide, acuminate at the apex; corolla subdisciform, 2–3 cm. across, the petals ovate, 1–1.4 cm. long, 0.8–1.2 cm. wide; stamens 35–38, the longest 8 mm. long; disc and style glabrous, the latter 6 mm. long, the upper one third or half divided; stigma clavate, the abaxial surfaces 1.5 mm. long, the adaxial ones slightly longer, split. Capsules obovoid, 8 mm. long, 6 mm. in diameter, the persistent sepals subapical. Seeds with very short tails, the testa fuscous, reticulate, and more or less rugose.

NORTHERN INDIA: Chamba State: between Kukti and Hursa, *W. Koelz 867* (NY). Punjab: Bashahr State, Simla district, in forest at Bhali, *R. N. Parker 3034* (A); near Sangla, *M. V. Laurie 3579* (A); Kulu, *W. Koelz 1981* (NY). Garhwal: Tihri, Jumna Valley, data on label obscure (A). Kumaon: *Wallich 3653C* (*R. Brown*, Kew); *R. Strachey & J. E. Winterbottom* (A, BH, G). Himal. Bor. Occ. Regio Temp.: *T. Thomson* (BH, G). Simore: *Wallich 3653B* (TYPE, Kew).

CULTIVATED: Europe: Hort. Bot. Berol., *E. Koehne 467* (A, G, ISOTYPE of *P. nepalensis* Koehne); Hort. Münkau, *A. Rehder 405* (A); Hort. Späth, *C. K. Schneider* in 1902 (A). United States: Arnold Arboretum 6004, *C. E. Faxon*, June 21, 1910 (A), June 14, 1911 (A); *A. Rehder*, July 18, 1918 (A), June 30, 1920 (A); Arnold Arboretum 15419 = 810–42, *S. Y. Hu*, June 13, 1951 (A).

When Wallich first recorded the Himalayan *Philadelphus*, he cited three collections under two binomials, *P. tomentosus* and *P. triflorus*. His list number 3653A was from Gossainthan, 3653b from Simore, and 3653C from Kumaon. G. Don validated *P. tomentosus* Wall. in 1832 by giving it a description in which he characterized that species as having ovate leaves which are acuminate, denticulate, and tomentose beneath. In 1835 Royle doubtfully suggested *P. triflorus* Wall. as a juvenile form of *P. tomentosus* Wall. From that time *P. triflorus* Wall. has been treated as a synonym of *P. tomentosus* Wall. In 1893 Koehne described *P. nepalensis* on the basis of a plant cultivated in the Botanical Garden in Berlin, and characterized it as a species with leaves glabrous except the principal nerves beneath. A few years later, in a discussion about that species, he suggested that *P. triflorus* Wall. might belong to the same taxon. If this is true, the glabrous Himalayan species should be called *P. triflorus* Wall. and not *P. nepalensis* Koehne, for the latter binomial is preoccupied. Through the kindness of Dr. N. L. Bor, Assistant Director of the Royal Botanic Gardens,

Kew, this supposition has been confirmed. Dr. Bor kindly asked Mr. L. L. Forman to examine the specimens of *Philadelphus* in the Wallich herbarium for me. According to his report *Wallich 3653A*, a fruiting specimen, labeled *P. tomentosus* Wall., has leaves pubescent below. This specimen should be the type of the species as validated by G. Don. *Wallich 3653B*, labeled *P. triflorus* Wall., has leaves, hypanthium, style and disk all glabrous. Thus there is no doubt as to what Wallich meant for *P. triflorus*. It is different from *P. tomentosus* Wall. and conspecific with *P. nepalensis* Koehne. Mr. Forman also remarked that *Wallich 3653C*, another fruiting specimen, labeled *P. tomentosus* Wall., has glabrous leaves and it appears to equal *3653B*.

This species is undoubtedly closely related to *P. tomentosus* Wall. Geographically and ecologically they cannot be separated. But morphologically *P. triflorus* Wall. has leaves glabrous beneath. At first I suspected the glabrous Himalayan element to be a variety of *P. tomentosus* Wall. But when I saw the very short-tailed seed of a specimen with glabrous leaves, I inclined toward keeping it as a distinct species. In a seed of *P. tomentosus* Wall. the testa is ochraceous and the tail is as long as the embryo. In *P. triflorus* Wall. the testa is fuscous and the tail is one fourth the length of the embryo.

This species has long been cultivated in Europe. *Rehder 405* was collected as early as 1888. In American gardens some specimens of this species are cultivated under the name *P. tomentosus*. The plants distributed by the Park Department of Rochester under the name *P. "magnificus"* definitely belong here.

The cultivated specimens all have castaneous exfoliating branchlets and the axils of the principal nerves barbate. In this respect they differ slightly from the spontaneous material, which has light brown bark and glabrous nerve angles beneath.

25. *Philadelphus lancifolius* Koehne in *Gartenfl.* 45: 561. 1896; et in *Mitt. Deutsch. Dendr. Ges.* 1904 (13): 82. 1904. — Engler, *Pflanzenfam.* ed. 2, 18a: 194. 1930.

TYPE: *C. B. Clarke 46543* (British Museum).

Shrub with grayish brown bark on the second year's growth. Leaves ovate or ovate-lanceolate, 4–7 cm. long, 1–3 cm. wide, caudate, the acumen about 2 cm. long, dentate, with 3–7 teeth on each side, 7-nerved, the lower surface thickly tomentose. Inflorescences pseudoracemose, 7- or 9-flowered, loose, the lower pairs in the axils of normal leaves. Flowers not known. Fruiting pedicels 1–1.5 cm. long; capsules obovoid, about 8 mm. long, 6 mm. in diameter, the persistent sepals super-median, the remaining basal portion of the style pubescent (according to Koehne). Seed not seen.

NORTHERN INDIA: Kumaon: *R. Blinkworth*, ex Herb. *C. B. Clarke 46543* (photograph of TYPE, A).

The foregoing description is a synthesis of characters that can be detected from a photograph of the type and those given by Koehne. In describing

the shape of the leaves Koehne used the words "länglich oder länglich-lanzettlich." I do not choose to employ the English equivalents of these words, for the leaves in the photograph of the type appear ovate or ovate-lanceolate to me.

The type is a fruiting specimen with the capsules all open and the styles broken off. Koehne observed hairs on the remaining basal portion of the style. By this character of the hairy style *P. lancifolius* Koehne is distinguished from its closely related species *P. tomentosus* Wall. *Philadelphus lancifolius* Koehne is known only from the type collection. Among all the Himalayan material that I have examined, I have seen no specimen with pubescent style. Although molds have been mistaken for hairs by eminent botanists, I hesitate to doubt Koehne's observation, for individuals with a pubescent style have been found in the natural populations of many regions, and they may also occur in western Himalaya. According to my understanding of the permanence of the styler hairs in species like *P. schrenkii* Rupr., I know that although the hairs are delicate, they are persistent and can be observed even on mature fruit. If the species does have a pubescent style, even though Koehne's material is rather advanced in age, his observation was not impossible.

Series 3. *Pekinenses*, ser. nov.

Philadelphus subg. II. *Euphiladelphus* sect. 4. *Stenostigma* ser 3. *Pekinenses*, ser. nov.

Philadelphus sect. *Stenostigma* subsect. *Coronarii* Koehne in Gartenfl. 45: 451, 596. 1896; et in Mitt. Deutsch. Dendr. Ges. 1904 (13): 84. 1904, pro parte.

Philadelphus sect. *Coronarii* (Koehne) Nakai in Bot. Mag. Tokyo 29: 64. 1915, pro parte.

Philadelphus ser. *Coronarii* (Koehne) Rehder, Man. Cult. Trees Shrubs ed. 2, 269. 1940; et Bibl. Cult. Trees Shrubs 192. 1949.

TYPE SPECIES: *P. pekinensis* Rupr.

Frutices saepe humiles, foliis ovatis vel ovato-ellipticis, apice acuminatis; inflorescentiis 5- usque 7-floris, hypanthiis glabris; corolla praesertim parva, 2-3 cm. (raro 3.5 cm.) diametro; staminibus 25 vel 30, raro plus; disco et stylo glabris, stigmatibus spatulatis vel clavatis, faciebus dorsalibus brevissimis; capsulis subglobosis vel ellipsoideis; seminibus breviter vel mediano-caudatis.

Species of this series are concentrated in the North China uplands, including Jehol, Hopei, Shansi, Shensi, and southern Kansu, and north-western Hupei. One species occurs in the hills outside Nanking, and its variety is found in the uplands of western Chekiang, Kiangsi and southern Anhwei.

KEY TO THE SPECIES OF THE SERIES

- A. Seeds very shortly caudate, the tails shorter than the embryo; capsules subglobose, the persistent sepals apical; rachis 0.2-1.5 cm. long; leaves glabrous on both surfaces. 26. *P. pekinensis*.

AA. Seeds medium caudate, the tail as long as the embryo; capsules ellipsoid, the persistent sepals supermedian; rachis 2–12 cm. long; leaves strigose on the principal nerves beneath.

B. Leaves very sparsely strigose above; style spatulate, the tail of the seed as long as the embryo; bark of the second year's growth brownish gray, closed. 27. *P. brachybotrys*.

BB. Leaves uniformly setose above, the trichomes compressed; style clavate; the tail of the seed half as long as the embryo; the second year's bark castaneous, exfoliate. 28. *P. laxiflorus*.

26. **Philadelphus pekinensis** Ruprecht in Bull. Phys.-Math. Acad. Sci. St. Pétersb. 15: 365. 1857; et in Mém. Biol. 2: 543. 1858. — Koehne in Gartenfl. 45: 597. 1896; et in Mitt. Deutsch. Dendr. Ges. 1904 (13): 84. 1904. — Bretschneider, Hist. Eur. Bot. Discov. China 349, 1054. 1898. — Schneider, Ill. Handb. Laubh. 1: 373, fig. 273, *p-r* et 238, *e-f*. 1905. — Silva Tarouca, Freidland-Laubgeh. 283, fig. 351. 1913; et 255, fig. 309. 1930. — Nakai in Bot. Mag. Tokyo 29: 65. 1915; et Fl. Sylv. Kor. 15: 50. 1926. — Limpricht in Fedde, Repert. Sp. Nov. Beih. 12: 402 (Bot. Ergeb. Reis. Hochgeb. Chin. Ost.-Tib.). 1922. — H. H. Hu, Ic. Pl. Sin 1: 29 1927. — Rehder in Jour. Arnold Arb. 5: 151. 1924, 8: 113. 1927, 12: 275. 1931; Man. Cult. Trees Shrubs 276. 1927; ed. 2. 270. 1940; et Bibl. Cult. Trees Shrubs 193. 1949. — Liu in Bull. Pek. Soc. Nat. Hist. II. 3: 104. 1925. — Minami, List Pl. Manch. Mong. 183. 1926. — Chen, Ill. Man. Chin. Trees Shrubs 373, fig. 279. 1937. — Kitagawa, Lin. Fl. Mansh. 253. 1939. — Sata, Ill. Manch. Mong. Trees ed. 2, 128. 1943. — Bean, Trees Shrubs ed. 7, 2: 417. 1950; et in Chitt, Dict. Gard. 3: 1546. 1951.

Philadelphus coronarius sensu Turcz. in Bull. Soc. Nat. Moscou X. 7: 151. 1837. — Maxim. in Mém. Div. Sav. Acad. Sci. St. Pétersb. 9: 471 (Ind. Fl. Pekin.). 1859, non Linn. 1753.

Philadelphus coronarius Linn. var. *pekinensis* Maxim. in Mém. Acad. Sci. St. Pétersb. Ser. VII. 10 (16): 42 (Rev. Hydrang. As. Or. 42). 1867. — Franch. in Nouv. Arch. Mus. Hist. Nat. Paris II, 6: 5 (Pl. David. 125). 1883. — Forbes & Hemsl. in Jour. Linn. Soc. Bot. 23: 278. 1887.

Philadelphus parviflorus Carr. in Rev. Hort. 1870: 460. 1870.

Philadelphus rubricaulis Carr. in Rev. Hort. 1870: 460. 1871. — Bretschneider, Hist. Eur. Bot. Discov. China 830. 1898. — Rehder, Man. Cult. Trees Shrubs 276. 1927; ed. 2, 270. 1940; et Bibl. Cult. Trees Shrubs 193. 1949, ? in syn.

Deutzia chaletii Lévl. in Fedde, Repert. Sp. Nov. 9: 451. 1911. — Rehder in Jour. Arnold Arb. 12: 275. 1931, in syn.

TYPE: *P. Y. Kirilov*, hills west of Pekin (Herb. Acad. Sci. St. Pétersb.).

A graceful, low, compact shrub up to 2 m. high, bark of second year's growth castaneous, exfoliating; current year's growth glabrous. Leaves ovate, those on the sterile shoot 6–9 cm. long, 2.5–4.5 cm. wide, obtuse or rounded at the base, long-acuminate at the apex, the acumen 2–2.5 cm. long, serrate, glabrous on both surfaces, occasionally bearded in the nerve

axils beneath, 5-nerved; those on the flowering shoot 3–4, rarely up to 7 cm. long, 1.5–2.5 cm. wide, glabrous on both surfaces, bearded in the axils of the principal nerves beneath, serrate, rarely subentire. Inflorescences 5-, 7-, 9-, rarely 3-flowered, the lowest pair of flowers often in the axils of normal leaves, the rachis 2–15 mm. long, the bracts linear, 3–4 mm. long, 0.5 mm. wide, ciliate, the pedicels 3–6 mm. long, glabrous; hypanthium and calyx glabrous; sepals ovate, 4 mm. long, 2.5 mm. wide, acuminate; corolla discoid, 2–3 cm. across, the petals obovate, 9–11 mm. long, 8 mm. wide; stamens 25, the longest 5–7 mm. long; disk and style glabrous, the style 4–5 mm. long, the upper one fifth to one fourth divided, the stigma subspatulate, the apical end enlarged, the abaxial surface short and broad, 1 mm. long, the adaxial ones three times as long. Capsules subglobose or obconic, 5–7 mm. in diameter, the persistent sepals subapical. Seeds short-tailed.

CHINA: J o h e l : *A. David* 2219 (G); Wei-chang, *Wm. Purdom* 83 (A). H o p e i (C h i h l i) : Peking and vicinity, Western Hills, *J. Hers*, 2515 (A), 2225 (A); Po-hau-shan, *J. Hers* 1462 (A), 1680 (A); same locality, *W. Y. Hsia* 2144 (NY); Miao-feng shan, *J. Hers* 2539 (A); Peking & Kalgan Road, hills near Great Wall, *J. G. Jack*, Oct. 5, 1905 (A); Kalgan Valley, *F. T. Wang* 20262 (NY); Men tou-kou, *T. F. King* 2 (NY); Ling-shan, *T. F. King* 626 (A, NY); Paefeng-tzi, *C. W. Wang* 60802 (A); (Tche-Ly) mont du Kouying, *L. Chanet* 416 (HOLOTYPE of *Deutzia chanetii* Lévl., A); Hsiao-wu-tai shan, *J. Hers* 1476 (A), 2183 (A), 2185 (A); same locality, *J. C. Liu* 1889 (NY); *F. M. Meyer* 1304 (A); *H. Smith* 313 (A); *C. W. Wang* 6165 (A); *T. P. Wang* 482 (NY); without precise locality, *L. Chanet* 61 (A). S h a n s i : Wu-tai shan, *J. Hers* 2642 (A); Ja siu, *C. T. Ren* ex Univ. of Nanking Herb. no. 6123 (A); Mien shan, *R. W. Chaney* 1069 (NY). S z e c h u a n : Teng-hsiang-ying, *H. Smith* 186 (A), 1935 (A).

CULTIVATED: Europe: Hort. Bot. Berol., *E. Koehne* 1904, 466 (A); Hort. Vilmorin; Plantière *C. Schneider* 1906. United States: Arnold Arboretum field no. 1769 (seed received from Bretschneider, flowered June 28, 1888); no. 1223 (introduced from Vilmorin, flowered in June 1899; no. 6596 (seed received from *W. Purdom*, Lot no. 174, flowered in June 1915), *S. Y. Hu*, June 1950. All this cultivated material has reddish brown nerves and petioles.

So far as I know the typical *P. pekinensis* Rupr. has been introduced to the western world on three occasions. Each introduction was in the form of seeds. The first came from E. M. Simon, who was collecting seeds in the hills west of Peking in 1862. These were sent to Paris in 1865. Plants raised from these seeds have reddish violet shoots, petioles, and nerves. Carrière in 1871 named the plant *P. rubicaulis*. The second introduction was by Bretschneider, who collected on the hills west of Peking in 1881–2. He sent the seeds to C. S. Sargent at the Arnold Arboretum, and also to Kew in England. Thus the living specimen now growing in the Arnold Arboretum is one of the oldest plants of this oriental species to be introduced into the western world. William Purdom collected seeds and specimens for the Arnold Arboretum in the mountainous area west and north of Peking, and his collections formed the third introduction of

this species. Plants raised from his seed, Lot no. 174, were first numbered Arnold Arboretum 6596, and later 20086. These plants first flowered in June 1915.

This species is a graceful compact shrub with the stems hidden by leafy branchlets. The current year's growth and the petioles are reddish brown. Just before the flowers open the buds have reddish purple stripes on the back. At anthesis the flowers are yellowish white with a pleasant fragrance. Many of the anthers bear no pollen. J. Hers recorded that in northern Shansi the people collect the young shoots and eat them as greens.

26a. *Philadelphus pekinensis* Rupr. f. *lanceolatus*, forma nov.

Frutex, ramulis glabris; foliis lanceolatis, 4–6.5 cm. longis, 1–2 cm. latis, basi cuneatis vel acutis, apice acuminatis, utrinque glabris, axilla nervorum barbatis; inflorescentiis 7-vel 9-floris, rhachibus 0.8–1.5 cm. longis, corolla subdisciformi, 2 cm. diametro.

CHINA: Hopei (Chihli): Hsiao-wu-tai-shan, C. F. Li 10522 (NY, TYPE).

This form differs from typical *P. pekinensis* Rupr. in having lanceolate leaves. According to the field label the type material was collected in August. It was in full bloom. Thus it is the latest blooming form known to the Old World.

27. *Philadelphus brachybotrys* Koehne ex Vilmorin & Bois, Frut. Vilm. Cat. Prim. 128. 1904. — Koehne in Sargent, Pl. Wils. 1: 5. 1911. — Bean, Trees Shrubs ed. 7, 2: 417. 1950.

Philadelphus pekinensis Rupr. var. *brachybotrys* Koehne in Mitt. Deutsch. Dendr. Ges. 1904 (13): 84. 1904. — Rehder, Man. Cult. Trees Shrubs 276. 1927; ed. 2, 270. 1940; et Bibl. Cult. Trees Shrubs 193, 1949.

TYPE: *M. L. de Vilmorin* (Herb. E. Koehne).

A large shrub up to 3 m. high, the bark of the second year's growth brownish gray, close; the current year's growth villose, becoming glabrescent. Leaves ovate, 2–6 cm. long, 1–3 cm. wide, rounded or obtuse at the base, shortly acuminate or acute at the apex, finely serrate or subentire, sparsely strigose above, strigose on the nerves beneath. Inflorescences 5- or 7-flowered, the lower pair of flowers often in the axils of normal leaves, the rachis 2–4 cm. long, sparsely villose, pedicels 3–5 mm. long, sparsely strigose, becoming glabrescent, hypanthium and calyx glabrous; sepals ovate, 4–6 mm. long, 3–4 mm. wide, acuminate; corolla cream-white, disciform, 2.5–3.5 cm. across, the petals suborbicular 1–1.5 cm. long, 1–1.3 cm. wide; stamens 31–40, the longest 8 mm. long; disc and style glabrous, the style subequal to the long stamens, the apical one third divided, the stigma spatulate, the abaxial surface 1 mm. long, the adaxial twice as long, narrowed gradually. Capsules ellipsoid, 7–10 mm. long, 5–7 mm. in diameter, the persistent calyx supermedian. Seeds short-tailed, the embryo 1–5 mm. long, the tail equaling the embryo in length.

CHINA: K i a n g s u : Nanking, Ox-head mountains, in woods, *C. L. Tso* 991 (A).

CULTIVATED: Arnold Arboretum no. 6596 (plant from Hort. Vilmorin, 1901), *A. Rehder*, June 18, 1908 (A); Hort. C. S. Sargent (Vilmorin), *A. Rehder*, June 26, 1909 (A); (Pl. L. Späth, Berlin), *A. Rehder* 104 (A).

This species can be distinguished by its pubescent current year's growth, close brownish gray bark of the two-year-old branchlets, sparsely strigose leaves, short rather crowded inflorescence and suborbicular petals. It was first established on the basis of a plant cultivated in the garden of M. L. de Vilmorin in France. According to the records supplied to Koehne by Vilmorin, it was raised from seed sent to him by a Father Mouton from Tschen-Kéu, Kiangsi Province. I have not been able to learn anything about this French missionary, nor could I find any place in Kiangsi that sounded like Tschen-Kéu. Thus it is impossible for me to supply the exact place of origin of this species in China. *C. L. Tso* 991 from Kiangsu is the only spontaneous material which fits Koehne's description for this species and matches the specimen collected from plants sent us from Hort. Vilmorin. It is closely related to *P. pekinensis* Rupr., a glabrous species of the North China highlands.

27a. *Philadelphus brachybotrys* Koehne var. *laxiflorus* (Cheng), comb. nov.

Philadelphus pekinensis Rupr. var. *laxiflorus* Cheng in Contr. Biol. Lab. Sci. Soc. China 10: 113. 1936.

LECTOTYPE: *T. Tang & W. Y. Hsia* 383 (A).

Shrub up to 6 m. high, the second year's growth grayish brown or castaneous, closed, the current year's growth glabrous; leaves ovate, 4–9 cm. long, 2–4.5 cm. wide, obtuse, acute or on sterile shoots rounded at the base, acuminate at the apex, the acumen 5–10 mm. long, serrate, sparsely strigose or glabrescent above, strigose on the principal nerves beneath; racemes loose, 5-, 7-, 9-flowered, the rachis 4–8 cm. long, glabrous, pedicels 5–8 mm. long, after fruiting up to 11 mm. long.

CHINA: C h e k i a n g : Tien-mo shan, *T. Tang & W. Y. Hsia* 383 (A, LECTOTYPE); same mountain, *H. H. Hu* 1551 (A), 1653 (A); West Lake, *H. H. Hu* 1497 (A); Yun-huo, *S. Chen* 1526 (A); Yen-tang shan, *C. Y. Chiao* ex Herb. Univ. Nanking no. 14682 (A); Chen-chiong, 40 miles south of Sia-chu, *R. C. Ching* 1740 (NY). A n h w e i : Whang shan, *R. C. Ching* 2923 (A), 3005 (A).

CULTIVATED: Nanking, First Agriculture School, *Chen* 2549 (A).

This variety appears to be common in the woods of the mountainous areas in Chekiang. Cheng cited 23 collections from ten different localities of that province. It is also common in southern Anhwei. In these provinces the plants occur in open thickets by rocky cliffs or shady woods at altitudes of 300 up to 1500 meters. The white fragrant flowers appear in June and the early part of July.

28. *Philadelphus laxiflorus* Rehder in Jour. Arnold Arb. 5: 152. 1924.

Shrub 2–3 m. high, the bark of two years' growth grayish brown or castaneous, exfoliating; current year's growth glabrous, fuscous. Leaves ovate-elliptic or elliptic, 3–8 cm. long, 1.5–3 cm. wide, on weak branches sometimes 2 cm. long, 0.8 cm. wide, acute, obtuse, or on vegetative branches rounded at the base, acuminate at the apex, the acumen 5–15 mm. long, finely serrate, uniformly setose above, the hairs compressed, sparsely villose on the principal nerves beneath, often bearded. Inflorescences 7-, 9-, or 11-flowered, the lower pairs of flowers in the axils of normal leaves, the rachis 6–12 cm. long, glabrous; pedicels 6–10 mm. long, glabrous; hypanthium and calyx glabrous; sepals ovate, 6 mm. long, 4 mm. wide, acuminate; corolla disciform, 2.5–3 cm. across, the petals suborbicular, 1.6 cm. in diameter; stamens 30–35, the longest 9 mm. long; disc and style glabrous, the style as long as the longest stamens, the upper one third divided, the stigma clavate, the abaxial surfaces 1.8 mm. long, the adaxial twice as long, narrowed gradually. Capsules ellipsoid, 8 mm. long, 6 mm. in diameter, the persistent sepals supermedian. Seeds short-tailed, the tails half as long as the embryo.

CHINA: Shansi: Fang-shan Hsien, Nan-yang Shan, *J. Hers* 2704 (A). Shensi: Tsingling, 60 km. south of Sian, *J. Hers* 2959 (A); Tai-pei Shan, *Wm. Purdom* 439 (TYPE, A). Kansu: Kwan Shan, *G. Fenzl*, May 22–29, 1935 (A). Hupei (Hupé): Monte Si-ho (On-tang Scian), *P. C. Silvestri* 3004 (A); without precise locality, *P. C. Silvestri* 4358a (A, photo & fragment), 4359 (fragment, A); 4360 (fragment, A); Poa-ken, *P. C. Silvestri* 4361 (A); Scian-kin, *P. C. Silvestri* 4363 (A).

CULTIVATED: United States: New York: Highland Park, *E. H. Costich*, June 7, 1916 (A). Massachusetts: Hort. C. S. Sargent, June 3, 1913 (A).

This species is distinguished by its exfoliating castaneous bark, uniformly setose leaves, loose inflorescences, glabrous pedicels, clavate stigma, ellipsoid fruit, and short-tailed seeds. Its glabrous hypanthium suggests close relationship with *P. pekinensis* Rupr. But the latter species has glabrous leaves, crowded inflorescences, and globose fruits. Both morphologically and geographically this species is intermediate between *P. pekinensis* Rupr. and *P. sericanthus* Koehne. The pubescence of its leaves resembles that of *P. sericanthus* Koehne, but Koehne's species has pubescent hypanthia. It is probably a natural hybrid of a northern species with some southern influence. It occurs in woods at altitudes of 1500–2000 meters in the Tsingling mountains, and its range extends northward along the Shansi and Kansu border, reaching the Lu-liang mountains. Its white flowers appear in June.

Silvestri's collections from the eastern end of the Tsingling Range have been named and distributed under some unpublished binomials of *Pampanini*.

Series 4. **Coronarii** (Koehne) Rehder

Philadelphus subg. II. **Euphiladelphus** sect. 4. **Stenostigma** ser. 4. **Coronarii** (Koehne) Rehder, *Man. Cult. Trees Shrubs* ed. 2, 269. 1940; et *Bibl. Cult. Trees Shrubs* 192. 1949.

Philadelphus sect. *Stenostigma* subsect. *Coronarii* Koehne in *Gartenfl.* 45: 451, 596. 1896.

TYPE SPECIES: *P. coronarius* Linn.

Upright arching or dwarf compact shrubs, the bark of the second year's growth exfoliate; leaves ovate, elliptic or lanceolate, serrate or subentire; inflorescences 5- up to 9-flowered, rarely ternate; hypanthia glabrous, rarely with a few crisp weak hairs; corolla varied, disciform or cruciform, many doubled; stamens 21-25; style divided; capsules turbinate; seed with medium-long tails.

This series covers all the European and Caucasian elements. Due to the long period of cultivation and through controlled hybridization of growers or accidental crosses of remote species brought into close association in gardens, many hybrids and garden varieties are now in existence.

KEY TO THE SPECIES

- A. Leaves ovate or elliptic; petals glabrous at the apex.
 - B. Disc and style glabrous. 29. *P. coronarius*.
 - BB. Disc and style pubescent. 30. *P. caucasicus*.
 - AA. Leaves lanceolate; petals hirtellous at the apex; rim of the disc hirsute; style glabrous. 31. *P. salicifolius*.
29. **Philadelphus coronarius** Linn., *Sp. Pl.* 470. 1753. — Kniphof, *Bot. Orig. Herb. Viv.* 5: pl. [65]. 1758. — Miller, *Dict. Gard.* ed. 8, [834]. 1768. — Hoppe, *Ect. Pl. Ratisb.* pl. 522. 1790. — Schmidt, *Oest. Allgem. Baumzucht* 1: 57, *pl.* 59, 60. 1792. — Curtis, *Bot. Mag.* 11: *pl.* 391. 1797. — Sturm, *Deutschl. Fl.* 1 (1): *pl.* [37]. 1798. — Lamarck, *Ill. Planches Bot.* pl. 420. 1791. — Willd., *Sp. Pl.* 2: 947. 1800. — D.C., *Prodr.* 3: 205. 1828. — Schrader in *Linnaea* 12: 388. 1838. — Loudon, *Hort. Brit.* 196. 1832; et *Arb. Frut. Brit.* 2: 951. 1838. — G. Don, *Gen. Syst.* 2: 807, *fig.* 114. 1832. — Schnizlein, *Iconogr.* 4: *pl.* 264. 1843. — Maxim. in *Mém. Acad. Sci. St. Pétersb.* VII. 10 (16): 36 (*Rev. Hydrang. As. Or.*). 1867. — Le Maout & Decaisne, *Traité Gén. Bot.* 260. 1868. — Koch, *Dendrol.* 336. 1869. — Boiss., *Fl. Orient* 2: 814. 1872. — Lavallée, *Arb. Segrez. Enum.* 114. 1877. — Hoffmann, *Pflanzenatlas*, *pl.* 39, *fig.* 244. 1881. — Nicholson, *Ill. Dict. Gard.* 3: 95, *fig.* 105. 1886. — Engler, *Pflanzenf.* III. 2a: 70. 1890; ed. 2, 18a: 191. 1930. — Koehne, *Deutsche Dendr.* 182. 1893; in *Gartenfl.* 45: 618. 1896; et in *Mitt. Deutsch. Dendr. Ges.* 1904 (13): 85. 1904. — Dippel, *Handb. Laubh.* 3: 335. 1893. — Nicholson in *Kew Hand-List* 1: 225. 1894; ed. 2, 373. 1902. — Fiori & Paol., *Ic. Fl. Ital.* 195, *fig.*

1696. 1895; et Fl. An. Ital. 1: 544. 1895. — Britt. & Brown, Ill. Fl. N. States Can. 2: 186. 1897; ed. 2, 232. 1913. — Rydb. in N. Am. Fl. 22: 164. 1905. — Merino, Fl. Descr. Ill. Gal. 1: 477. 1905. — Syereishtchikof, Ill. Fl. Mosc. 2: 220, *fig. 1*. 1907. — Pereira, Fl. Port. 284. 1913. — Bonnier, Fl. Compl. France Suisse Belg. 4: 40, *pl. 194*. 1921. — Hegi, Ill. Fl. Mittel.-Eur. IV. 2: 640, *fig. 978*. 1922. — Liu in Bull. Pek. Soc. Nat. Hist. 2 (3): 103. 1925. — Rehder, Man. Cult. Trees Shrubs 277. 1927; ed. 2, 271. 1940; et Bibl. Cult. Trees Shrubs 193. 1949. — Chen, Ill. Man. Chin. Trees Shrubs 374, *fig. 280*. 1927. — Bean, Trees Shrubs, ed. 7, 2: 411, *pl. 34*. 1950; et in Chitt. Dict. Gard. 3: 1546. 1951.

Frutex coronarius Clus., Hist. 1: 55. 1601.

Syringa suaveolens Moench, Meth. 678. 1794.

Philadelphus salzmanni Hort. ex Koch, Dendrol. 1: 338. 1869, *nom. nud.*, in syn.

Philadelphus kochianus Koehne, Deutsche Dendr. 183. 1893.

Philadelphus triflorus Hort. ex Nicholson in Kew Hand-List 1: 225. 1894, non Wall.

Philadelphus coronarius var. *vulgaris* Schrad. ex DC., Prodr. 3: 205. 1828. — Loudon, Arb. Frut. Brit. 2: 951. 1838.

Philadelphus aromaticus Hort. ex Steud. Nom. 611. 1840.

Philadelphus coronarius var. *genuinus* Maxim. in Mém. Acad. Sci. St. Pétersb. VII. 10 (16): 37 (Rev. Hydrang. As. Or.). 1867. — Franch. & Sav., Enum. Pl. Jap. 1: 56. 1873.

Philadelphus deyrolleanus Lavallée, Arb. Segrez. Enum. 116. 1877.

Philadelphus kochianus Koehne, Deutsche Dendr. 188. 1893.

Philadelphus pallidus Hayek ex Schneider, Ill. Handb. Laubh. 1: 373, *fig. 237, x-z; 238, h-k*. 1905. — Hayek, Fl. Steierm. 1: 725. 1909. — Hegi, Ill. Fl. Mittel.-Eur. IV. 2: 641. 1922. — Prodan, Fl. Determ. Descr. Pl. Rômania 1: *pl. 8, fig. 88*. 1923. — Engler, Pflanzenf. ed. 2, 18a: 192. 1930. — Sata, Ill. Manch. Mong. Trees ed. 2, 127, *fig. 90*. 1943.

Philadelphus zeyheri var. *kochianus* (Koehne) Rehder in Jour. Arnold Arb. 1: 201. 1920; Man. Cult. Trees Shrubs 277. 1927; ed. 2, 272. 1940; et Bibl. Cult. Trees Shrubs 194. 1949.

TYPE: Linnaean Herbarium No. 634.1.

An upright, rather stiff shrub with some arching branches, the second year's growth moderately exfoliate, the current year's growth brown, sparsely pubescent or glabrescent. Leaves ovate, 4.5–9 cm. long, 2–4.5 cm. wide, subglabrous, pubescent on the primary nerves and nerve-angles beneath; subdentate with 6 to 11 teeth on each side, obtuse or acute at the base, 3- or 5-nerved, acuminate at the apex. Flowers fragrant, the inflorescence a determinate raceme, 5- to 9-flowered, more on vigorous twigs or less on weak ones, the last pair usually in the axils of normal leaves, sometimes cymose; hypanthia glabrous with few hairs at the base merging into the sparsely pubescent pedicel; at anthesis the pedicels 6–10 mm. long, in fruit 6–20 mm. long; sepals ovate, 4–5 mm. long, glabrous; corolla subdisciform, 2.5–3 cm. across, the petals oblong-obovate, 12–14 mm. long, 11 mm. wide, the apex rounded; stamens ca. 25; disc and style glabrous,

the adaxial stigmatic surface three times longer than the abaxial. Capsules turbinate, 6–8 mm. long, 5–6 mm. in diameter, the persistent calyx subapical. Seed spindle-shaped, 3 mm. long, 0.75 mm. wide, the testa brown, slightly striate, the slender tail as long as the minute embryo.

AUSTRIA: Wien, *Handel-Mazzetti* on June 16, 1935 (A).

CAUCASUS: Borjom, C. S. *Sargent*, July 19, 1903 (A); Kuban, N. *Busch* & P. *Klopotow*, May 1907 (A).

CULTIVATED: Europe: Upsala, Linnaean Herb. 634.1 (photo of TYPE, A). Hort. Göttingen, A. *Rehder* 1612, 1614, 1635, 1641, 1670, 2230 (all at A); Hanover, Botanischer Garten der Forstakademie, H. *Zabel* in 1873 (A). Hort. Simon Louis, Plantière, C. K. *Schneider* in 1906 (A). United States: Arnold Arboretum 4785–1 (A).

Philadelphus coronarius Linn. is the type species of the genus. It is also the most widely cultivated and the best known species of the genus. Written accounts about it can be found in almost all languages existing in the northern hemisphere. The relatively large number of references cited above represent only a selection from the more important literature regarding it. It has been associated with man since time immemorial, and its nativity is now obscure. Thus botanists have no agreement regarding its origin. Modern horticulturists and taxonomists like Bean of Kew and Rehder of the Arnold Arboretum consider it a native of southern Europe, from Italy to the Caucasus. I have not been able to find any statement to this effect in the floras of these regions. As early as the sixteenth century Clusius observed its occurrence in Spain, Austria and Hungary, remarking at the time that it had never been found in a wild state in those countries. He thought that it might have been first cultivated in Belgium. When Linnaeus established the species he doubtfully assigned its origin to Verona. Schrader in 1838 gave a negative statement as to the possibility of its spontaneous occurrence in southern Germany and Bohemia and suggested that it had probably been introduced from the Orient, possibly from Japan. Boissier in his *Flora Orientalis* maintained that it was not truly spontaneous in the area covered. As to the countries of southern Europe, I have not been able to find in the published floras of Italy, Spain, or Portugal any statement about its spontaneous occurrence in those countries.

Morphologically this species has the seed character of the Japanese element, the leaf and style characters of the Amur River element. In spite of the relative geographical proximity, its relationship with the Himalayan element is rather remote.

In early botanical literature there are two elements ascribed to *P. coronarius*. One is the material typified by the specimen in the Linnaean herbarium, and the other is represented by the plate in Bot. Mag. 11: pl. 391. 1797. The leaves of the plant pictured in this plate have coarser teeth, acute sepals, and elliptic petals. It suggests *P. lewisii* Pursh rather than the Linnaean species.

Cultivation has apparently proved that *P. coronarius* Linn. is a heterogeneous species. Through special care growers have segregated and prop-

agated many garden varieties which appear completely different from the typical form. Some of these forms are compact and dwarf, while others are stiff and rather loose in habit. Nearly all of them have short, depauperate inflorescences. Some of them are shy to flower, and some others rarely flower — for example, Dippel observed a twenty-year-old dwarf form which had never flowered. Many have double flowers. Some of them have been treated as putative hybrid species by some authors and forms or varieties of *P. coronarius* Linn. by others. As none of them occurs in the wild state, they are treated as garden varieties here.

KEY TO THE VARIETIES OF *P. coronarius*

- A. Leaves uniformly green.
 - B. Low compact shrubs up to 1 meter high.
 - C. Leaves opposite, 2 at each node.
 - D. Pedicels villose. a. var. *duplex*.
 - DD. Pedicels glabrous.
 - E. Flowers highly doubled, the petals pointed at the apex. b. var. *deutziaeflorus*.
 - EE. Flowers semi-doubled, the petals rounded at the apex. c. var. *dianthiflorus*.
 - CC. Leaves verticillate, 3 at each node. d. var. *cochleatus*.
 - BB. Tall shrubs over 2 m. high, the branchlets stiff and loose, rarely drooping; leaves ovate, ovate-elliptic, or elliptic.
 - C. Flowers simple. e. var. *zeyheri*.
 - CC. Flowers doubled. f. var. *primulaeflorus*.
 - AA. Leaves variegated. g. var. *variegatus*.

- 29a. *Philadelphus coronarius* Linn. var. *duplex* West., Univ. Bot. 1: 205. 1770. — Rehder, Man. Cult. Trees Shrubs 277. 1927; ed. 2. 271. 1940. — Chen, Ill. Man. Chin. Trees Shrubs 375. 1937.

Philadelphus nanus Mill., Gard. Dict. ed. 8, 34. 1768.

Philadelphus coronarius Linn. var. *nanus* Aiton, Hort. Kew. 2: 155. 1789. — DC., Prodr. 3: 205. 1828. — Schrader in Linnaea 12: 390. 1838. — Anon. in Gard. 40: 289. 1891. — Dippel, Handb. Laubh. 3: 337. 1893. — Voss, Vilmor. Blumengärt. 1: 290. 1894. — Bean, Trees Shrubs ed. 7, 2: 412. 1950.

Philadelphus coronarius nanus Granz Schmidt, Oester. Allg. Baumz. 1: 57, t. 60. 1792.

Philadelphus coronarius var. *flore plena* Loddiges ex Loudon, Arb. Brit. 2: 951. 1838. — Anon. in Garden 40: 289. 1891.

Philadelphus coronarius Linn. var. *pumilus* West., Univ. Bot. 205. 1770. — Rehder, Man. Cult. Trees Shrubs 277. 1927; ed. 2, 271. 1940. — Chen, Ill. Man. Chin. Trees Shrubs 375. 1937.

Philadelphus coronarius Linn. forma *pumilus* (West.) Rehder, Bibl. Cult. Trees Shrubs 193. 1949.

LECTOTYPE: Kew, G. Nicholson 1307 (A).

Dwarf shrubs, the branchlets castaneous, the bark of the second year's growth exfoliating, the current year's growth villose, the hairs compressed,

the leaves oblong-elliptic, 3–5 cm. long, 1–2.5 cm. wide, inconspicuously villose on both surfaces, serrate, those on the virgin shoots broad ovate, 6–8 cm. long, 4–4.5 cm. wide, abruptly acuminate, coarse dentate, uniformly villose, the hairs $\pm$ erect; flowers doubled, ternate or in depauperate 5-flowered, rarely 7-flowered racemes with the lower ones in the axils of normal leaves, the pedicels 2–3 mm. long, villose; the hypanthium and calyx glabrous or glabrescent; corolla 2.5 cm. across, the petals oblong, rounded at the apex.

ENGLAND: Kew, *G. Nicholson* 1307 (A), 2597 (A).

GERMANY: Hort. Göttingen, *A. Rehder* 1606 (A).

AUSTRIA: *Henric Braun*, May 15, 1907 (A); *Handel-Mazzetti*, June 16, 1935 (A).

UNITED STATES: Massachusetts: Cambridge Bot. Gard., June 3, 1880 (A); Arnold Arboretum field no. 2784 (A). California: Univ. of California Bot. Gard. no. 3434.

This variety probably originated in the gardens of England, where it has been known as *nanus*. Rehder, in his *Manual of Cultivated Trees and Shrubs*, recognized two varieties, *duplex* and *pumilus*, both of which have *nanus* as a synonym. Although he gave no reason for this separation, one judges, from the material he worked with, that he named the flowering specimen *duplex* and the non-flowering specimens *pumilus*. The British *nanus* is well known for its tardiness in flowering. Dippel recorded one case where the plant was twenty years old and had never flowered. I have examined both the flowering and the sterile specimens with a microscope to see if there may be a difference in the type of hairs present on the branchlets and leaves. I see no reason for keeping *duplex* and *pumilus* as distinct varieties. As *duplex* is the older varietal name, it should be the valid name for this variety. It can be recognized by its dwarf habit, pubescent branchlets and leaves, tardiness and paucity in flowering, double flowers with glabrous hypanthia and calyces, and its rounded petals.

- 29b. ***Philadelphus coronarius* Linn. var. *deutziaeflorus* Hartwig, Ill. Gehölzb. 258. 1892. — Schelle in Beissner & al., Handb. Laubh.-Ben. 128. 1903. — Rehder, Man. Cult. Trees Shrubs 277. 1927; ed. 2, 271. 1940.**

Philadelphus coronarius Linn. forma *deutziaeflorus* (Hartwig) Rehder in Jour. Arnold Arb. 1: 201. 1919; et Bibl. Cult. Trees Shrubs 193. 1949.

Philadelphus coronarius Linn. var. *multiflorus plenus* Rehder in Bailey, Cycl. Am. Hort. 3: 1298. 1901, *nom. nud.*

LECTOTYPE: Arnold Arboretum 5852, *A. Rehder*, June 23, 1920 (A).

A low compact shrub, the branchlets castaneous, the bark of the second year's growth exfoliating, the current year's growth glabrous, the newly growing vegetative shoots inconspicuously pilose; leaves ovate, 2–5 cm. long, 1.5–2.5 cm. wide, glabrous on both surfaces, occasionally inconspicuously pilose on the principal nerves, subentire or finely serrate at the

apical end, those on the vegetative shoots up to 9 cm. long, 6 cm. wide, glabrous except on the principal nerves and nerve-angles beneath; flowers doubled, in 3's, or in depauperate 5-flowered racemes, the pedicels glabrous, 7–10 mm. long; hypanthium and calyx glabrous; corolla 3 cm. across, the petals more or less pointed at the apex.

UNITED STATES: Arnold Arboretum 5852, without collector, June 21, 1916 (A); *A. Rehder*, June 23, 1920 (A, LECTOTYPE).

This variety probably originated in the Späth Nursery at Berlin.

29c. *Philadelphus coronarius* var. *dianthiflorus* Dippel, Handb. Laubh. 3: 337. 1893. — *Rehder* in *Bailey*, Cycl. Am. Hort. [3]: 1298. 1901. — *Bean*, Trees Shrubs 2: 133. 1914, ed. 7, 2: 412. 1950, et in *Chitt.*, Dict. Gard. 3: 1546. 1951.

LECTOTYPE: Arnold Arboretum 2222–1, *A. Rehder*, June 23, 1920 (A).

A dwarf shrub with arching branchlets, the second year's growth gray, with close but tardily wearing off bark, the current year's growth glabrescent; leaves oblong-ovate, very weakly denticulate, 1.5–5.5 cm. long, 1–3.5 cm. wide, obtuse or rounded at the base, short and abruptly acuminate at the apex, glabrescent on both surfaces, those on the vegetative shoots up to 9 cm. long, 6 cm. wide, sparsely strigose-villose beneath; flowers in 3's, solitary or 5 in short determinate racemes, the pedicels, hypanthia and calyces glabrous; the corolla semidoubled, the petals rounded at the apex.

GERMANY: Botanischer Garten der Forstakademie, Hannover, *H. Zabel*, June 13, 1894.

UNITED STATES: Arnold Arboretum, *A. Rehder*, June 23, 1920.

This variety appeared first in German literature. It probably originated in that country. The above-cited *Zabel* collection represents the oldest specimen of this form that I have examined. This specimen records that as early as 1889 it was ready for distribution in the Späth nursery at Berlin. It is closely related to *P. coronarius* var. *primulaeflorus*. It can be readily distinguished from the latter variety by its dwarf habit, semidouble flowers, and glabrous pedicels. It is also closely related to *P. coronarius* var. *deutziaeflorus*. The latter variety has highly doubled flowers with pointed petals and more sharply serrate leaves.

29d. *Philadelphus coronarius* Linn. var. *cochleatus* Lavallée, Arb. Segrez. Enum. 114. 1877, *nom. nud.*

LECTOTYPE: *C. Schneider*, Sept. 1903 (A).

A low shrub, the branchlets glabrous, leaves 3 at a node, verticillate, broad-elliptic, 2–2.5 cm. long, 1–2 cm. wide, obtuse at both ends, subentire, with 2 or 3 minute, inconspicuous teeth on each side, glabrescent above, hirsute on the principal nerves beneath. The flowers not known.

FRANCE: Plantières, Herb. Dendr. Schneider, Sept. 1903 (A).

I have not been able to locate the valid publication of this trinomial. It apparently originated in France and has not been popular among growers. The only specimen that I have seen is sterile. The lower three pairs of leaves of this specimen are opposite, and the upper ones are verticillate, three at each node. Although there is no flower, I do not doubt its identity as a *Philadelphus*, and I think it is a distinct variety.

- 29e. *Philadelphus coronarius* var. *zeyheri* (Schrader) Hartwig & Rümpler, Baume Sträuch 391. 1875.

Philadelphus zeyheri Schrader ex DC., Prodr. 3: 205. 1828; et in Linnaea 12: 390. 1838. — Loudon, Arb. Frut. Brit. 2: 952. 1838. — Lavallée, Arb. Segrez. Enum. 115. 1877. — Rehder, Man. Cult. Trees Shrubs 277. 1927, ed. 2, 271. 1940; et Bibl. Cult. Trees Shrubs 191. 1949. — Bean, Trees Shrubs ed. 7, 2: 420. 1950; et in Chitt., Dict. Gard. 3: 1547. 1951.

TYPE: Cultivated, *Schrader*, 1827 (Genève).

An erect shrub up to 2 m. high, the bark of the second year's growth castaneous, exfoliate, the current year's growth sparsely pilose; leaves ovate, those on the vegetative shoot 6–10 cm. long, 3–6 cm. wide, those on the flowering shoot 4–5 cm. long, 2.5–3.5 cm. wide, rounded or obtuse at the base, acuminate at the apex, serrate, glabrous above, sparsely pilose on the nerves beneath; inflorescences 3- or 5-flowered; when 5, the lower pair in the axils of normal or diminuted and lanceolate leaves; hypanthia glabrous; sepals ovate, 5 mm. long, 3 mm. wide at the base; corolla disciform, 2.5–3 cm. across, the petals suborbicular, 1–1.5 cm. in diameter; stamens ca. 32; disc and style glabrous, the stigma clavate, the adaxial surfaces 4–6 times longer than the abaxial; capsules turbinate, 7 cm. long, 6 cm. in diameter.

CULTIVATED: Europe: Kew, *G. Nicholson* 1318 (A), 1319 (A); Conservatoire et Jardin botaniques, *Schrader*, 1827 (Genève, TYPE; photo A); Bot. Gart. Forstakademie, Hannover 6, *H. Zabel*, June 17, 1873 (A), Sept. 1, 1873 (A); Wien, *N. Braun* in 1907 (A). United States: Arnold Arboretum 5881-1 = 15425, without collector, June 30, 1913 (A), Sept. 10, 1913 (A), June 13, 1914 (A); 7872, *A. Rehder*, July 18, 1918 (A), June 19, 1919 (A).

When Schrader published *P. zeyheri* he accredited the taxon to American origin. As its wild equivalent is not known in the New World, and as its exfoliation of the bark and dentation of the leaves match best with *P. coronarius* Linn., it is thus treated as a cultivar of this species. Rehder treated it as a putative hybrid between *P. coronarius* and *P. inodorus* or *P. grandiflorus*. Part of his material has pubescent discs. When those specimens are taken out, the rest fit well as a variety of *P. coronarius* Linn. What Rehder considered as $\times$ *P. zeyheri* var. *kochianus* is a normal *P. coronarius* Linn.

- 29f. *Philadelphus coronarius* [var.] *primulaeflorus* [Carr.] T. Moore in Flor. Pom. 1873: 182, fig. 1873. — Rehder, Man. Cult. Trees

Shrubs 277. 1927; ed. 2, 271. 1940. — Chen, Ill. Man. Chin. Trees Shrubs 375. 1937.

Philadelphus primulaeflorus Carr. Rev. Hort. 1870: 305, fig. 47. 1871. — Anon. in Gard. Chron. 1871: 5. 1871. — T. Moore, l.c.

Philadelphus coronarius forma *primulaeflorus* Nicholson, Ill. Dict. Gard. 3: 94, fig. 106. 1887. — Schelle in Beissner & al., Handb. Laubh.-Ben. 128. 1903. — Rehder, Bibl. Cult. Trees Shrubs 193. 1949.

Philadelphus coronarius var. *primulaeflorus plenus* Hartwig, Ill. Gehölzb. 258. 1892.

Philadelphus coronarius var. *rosaeiflorus plenus* Hort. ex Hartwig, l.c. — Moore in Bailey, Stand. Cycl. Hort. 5: 258. 1916, in syn.

Philadelphus keteleeri Hort. ex Dippel, Handb. Laubh. 3: 337. 1893, in syn.

Philadelphus coronarius var. *multiflorus plenus* Hort. ex Rehder in Bailey, Cycl. Am. Hort. [3]: 1298. 1901, *nom. nud.* — Moore in Bailey, Stand. Cycl. Hort. 5: 2580. 1916.

Philadelphus coronarius var. *plenus* Bean, Trees Shrubs ed. 7, 2: 412. 1950.

LECTOTYPE: Arnold Arboretum 6600, *A. Rehder*, June 19, 1919.

A compact tall shrub up to 2 m. high, with arching branchlets, the second year's growth castaneous, the bark exfoliating, the current year's growth sparsely but verrucosely villose, the hairs with thickened bases; leaves broad-ovate, 3–7 cm. long, 2–4 cm. wide, those on the vegetative shoots up to 9 cm. long, 7 cm. wide, rounded at the base, abruptly short-acuminate at the apex, sparsely pilose along the nerves above, strigose-villose beneath; flowers in 2's or 3's, solitary, or five in a crowded determinate raceme with the lower pair in the axils of normal leaves, the pedicels 4–8 mm. long, sparsely but uniformly villose, the hairs erect, $\pm$ compressed; hypanthium glabrous, with a few hairs at the base or on the angles; calyx glabrous, broad-ovate, 6 mm. long, 3–4.5 mm. wide, acuminate at the apex; corolla 3–3.5 cm. across, with doubled petals; stamens generally sterile, with various modifications. Fruit obconic; seeds generally not fertile, with relatively short tails.

CULTIVATED: United States: Arnold Arboretum: *A. Rehder*, July 18, 1918 (A), June 19, 1919 (A); *E. J. Palmer*, June 11, 1936 (A).

This variety is of garden origin. Obviously it is a hybrid with unknown pedigree. Carrière, who first observed it in a French garden, interpreted it as a species. He did not give its history or establish its affinity. Two years later T. Moore summarized Carrière's account in English and reproduced the original illustration under the name *P. coronarius primulaeflorus*. He failed to give a definite rank to this trinomial, which I interpret as a variety. The subentire broad-ovate leaves and the relatively small number of flowers in each inflorescence, and the large sepals, suggest some relation with *P. inodorus* Linn. Based on obvious morphological characters, it is legitimate to assume it to be a hybrid between *P. coronarius* Linn. and *P. inodorus* Linn. According to available records this variety was introduced in America through the Arnold Arboretum in November 1908, under the field number 6600. The Späth Nursery in Berlin was then its distributor.

- 29g. *Philadelphus coronarius* Linn. var. *variegatus* Weston, Univ. Bot. 1: 205. 1770. — Lodd., Cat. 25. 1823. — Loudon, Arb. Frut. Brit. 2: 951. 1838. — Anon. in Garden 40: 209. 1891. — Chen, Ill. Man. Chin. Trees Shrubs 375. 1937. — Bean, Trees Shrubs 2: 134. 1914; ed. 7, 412. 1950.

Philadelphus coloratus Dippel, Handb. Laubh. 3: 338. 1893, pro parte.

Philadelphus coronarius forma *variegatus* (West.) Schelle in Beissner & al., Handb. Laubh.-Ben. 128. 1903. — Rehder, Cult. Trees Shrubs ed. 2, 271. 1940; et Bibl. Cult. Trees Shrubs 193. 1949.

Philadelphus coronarius Linn. *fol. argenteo-marginatis* Hort. ex Dippel, l.c., in syn. — Moore in Bailey, Stand. Cycl. Hort. 5: 2580. 1916.

LECTOTYPE: Hort. Parkman, June 19, 1881 (A).

A sickly-looking dwarf shrub, the second year's growth gray, the bark closed, tardily wearing off, the current year's growth sparsely villose; leaves ovate, $\pm$ deformed, 2–3 cm. long, 1.5–2 cm. wide, white at the margin, rounded at the base, acute at the apex, glabrous or glabrescent above, sparsely villose, especially on the nerves beneath; flowers in 3- or 5-flowered depauperate racemes, the pedicels 2–6 mm. long, villose; hypanthium and calyx glabrous or glabrescent; corolla disciform, 2.5 cm. across, the petals suborbicular, 10 mm. in diameter; stamens ca. 25, many anthers appearing sterile; disc and style glabrous, the style 5 mm. long, divided almost to the base.

CULTIVATED: United States: Hort. Parkman, June 19, 1881 (A).

This variety was known to growers in England as early as 1770. There is no record about its origin. It is very likely a sport of *P. coronarius*. Although the standard manuals or encyclopedias of American horticulture all devote a line to this plant, it is extremely rare in American gardens. The above cited specimen is the only one that I have seen.

30. *Philadelphus caucasicus* Koehne in Gartenfl. 45: 619. 1896; et in Mitt. Deutsche Dendr. Ges. 1904 (13): 85. 1904. — Schneider, Ill. Handb. Laubh. 1: 374. 1905. — Poiarkova in Komarov, Fl. URSS 9: 220. 1939.

TYPE MATERIAL: Abchasien, *Karpinsky*; Kuban, *Kusnetzoff*; Pontische Region, *Kusnetzoff*.

An upright shrub with some arching branches, the second year's branchlets light brown, exfoliate, the current year's growth brown, weakly villose. Leaves elliptic or ovate-elliptic, 5–9 cm. long, 2–3, rarely up to 4 cm. wide, obtuse or acute at the base, 5- rarely 3-nerved, abruptly short-acuminate at the apex, subentire or very faintly and remotely serrulate, each side with 0 to 8 teeth, glabrous or glabrescent above, uniformly pubescent beneath, the hair villose. Flowers in determinate racemes, 5- to 9-flowered, the pedicels 3–10 mm. long, weakly villose; hypanthium and calyx weakly loose villose, the hair slightly crisp; sepals ovate, 5–6 mm. long, 3.5 mm. wide; corolla subdisciform, 3 cm. across, the petals obovate, 1.3 cm. long.

1 cm. wide, stamens ca. 22, the longest 6 mm. long, disk and style densely yellow villose, the style 6 mm. long, the upper one-third divided, the stigma clavate, the adaxial surface on a narrow ridge, twice as long as the abaxial. Capsules turbinate, 6–7 mm. long, 5–8 mm. across the top, the persistent sepals apical. Seed rather plump, short-caudate, the embryo ca. 1.25 mm. long, 0.75 mm. wide, the tail half as long as the embryo, often obtuse, the crown with rounded lobes.

EUROPE: Russia: Kutais, *A. Lomoikin*, May 1922 (A). Transcaucasia: Azerbajdzhan, distr. Zakataly, *I. Beidemann*, July 21, 1935 (A).

Koehne proposed this species on the basis of three collections, not designating any one as the type. As these materials are not available to me, the identification of this species is made on the basis of his description. Accordingly, the specimens with uniformly pubescent lower leaf-surfaces, weakly pubescent hypanthia and sepals, and pubescent disc and style are interpreted as the typical *P. caucasicus* Koehne.

The Caucasian material that I have examined demonstrates an obvious difference in the density of the hairs on the hypanthia and styles. Some plants apparently have glabrous hypanthia and styles. The fruiting specimens of these plants also have glabrous lower leaf-surfaces. In this respect they approach *P. coronarius* Linn. Nevertheless they can be distinguished from the latter species by their pubescent discs. The plants cultivated in outstanding American botanical gardens are this glabrous form. That in the Arnold Arboretum, numbered 21326-B, exhibits variations in the sizes of the leaves and flowers. On a vigorously growing branchlet the leaves are 6 cm. long and 3 cm. wide, and the petals are 12 mm. wide. On a weak branchlet of the same plant the leaves are only 3 cm. long, 1.3 cm. wide, and the petals are 8 mm. wide. The indumentum on the large and small leaves and flowers is the same. This observation seems to prove that the pattern of the indumentum of the individual plants in this group is a rather stable character. Thus I think the glabrous form is distinct enough to warrant a varietal name.

There is a yellow-leaved old garden form which has been assigned as a variety of *P. coronarius* in standard manuals dealing with trees and shrubs for the last half-century. An examination of the specimens at hand, sent to the Arnold Arboretum from various botanical gardens, reveals that they all have pubescent styles and discs. Thus a transfer is necessary.

KEY TO THE VARIETIES OF *P. caucasicus*

- A. Tall mound-shaped shrub up to 2.5 m. high; leaves green; hypanthia very sparsely pilose or glabrous. a. var. *glabratus*.
- AA. Low shrub 1–1.5 m. high; leaves yellow; hypanthia uniformly sparsely villose. b. var. *aureus*.

30a. *Philadelphus caucasicus* var. *glabratus*, var. nov.

Philadelphus caucasicus sensu Rehder, Man. Cult. Trees Shrubs ed. 2, 271. 1940; et Bibl. Cult. Trees Shrubs 193. 1949, non Koehne.

Frutex 2–2.5 m. altus, ramis griseis, bienniis castaneis, exfoliatis, hor-notinis sparse villosis; foliis ellipticis vel ovato-ellipticis, 3–7 cm. longis, 1.5–3 cm. (raro usque ad 4 cm.) latis, basi acutis, obtusis, raro rotundatis, apice breviter acuminatis, supra glabris vel glabrescentibus, raro sparse strigoso-villosis; inflorescentiis racemosis, 7- usque ad 11-floribus; pedicellis, hypanthiis et calycibus glabris, disco villosus, stylo glabro.

EUROPE: C a u c a s u s : Tiflis, *S. Michajlowsky*, Sept. 1903 (A); Kutais, *A. Lomoikin*, May 1922 (A); Kuban, *V. J. Vorobjew & B. N. Klopoto*w, July 1, 1906 (A, TYPE); same locality, *N. Busch & B. Klopoto*w, May 11, 1907 (A).

CULTIVATED: E u r o p e : Hort. Göttingen, *A. Rehder* 1609 (A), 1637 (A); Hort. Müskau, *A. Rehder*, July 1888 (A); Bot. Gart. Forstakademie 15, *H. Zabel*, June 17, 1873 (A). United States: Arnold Arboretum 6964, without collector, June 13, 1914 (A); 21703-A, *E. J. Palmer*, June 6, 1936 (A); 21703-B, *E. J. Palmer*, June 18, 1940 (A), *S. Y. Hu*, June 8, 1951 (A); 22482, *E. J. Palmer*, June 10, 1927 (A); 948-27, *C. E. Kobuski & C. K. Allen* in 1933 (A).

The genuine *P. caucasicus* Koehne has not been known in cultivation. The plants introduced into American gardens from the Caucasus belong to this variety. Arnold Arboretum 21707-A is raised from seed obtained from the Botanical Garden at Tiflis, and 21326-B came from the Boyce Thompson Institute, Yonkers, N. Y.

30b. *Philadelphus caucasicus* var. *aureus* (Rehder), comb. nov.

Philadelphus coronarius var. *aureus* Hort. ex Rehder in Bailey, Cycl. Am. Hort. [3]: 1298. 1901.

Philadelphus coronarius var. *fol. aureis* Hartwig, Ill. Gehölzb. 259. 1892.

Philadelphus coronarius forma *aureus* Hort. ex Schelle in Beissner et al., Handb. Laubh.-Ben. 128. 1903.

LECTOTYPE: Arnold Arboretum 5953, without collector, June 11, 1914 (A).

A sickly-looking shrub, 1.5 m. tall, the bark of the second year's growth castaneous, exfoliating, the current year's growth sparsely villose; leaves ovate, 3–5 cm. long, 1.5–3 cm. wide, obtuse or rounded at the base, shortly acuminate at the apex, yellow-green, prominently serrate, glabrous above, strigose-pilose on the principal nerves and in their angles; inflorescences 5-, 7-, rarely 3- or 9-flowered, the hypanthia with few hairs at the base, the sepals glabrous, ovate, 5 mm. long, 3–4 mm. wide; corolla disciform, 2.5 cm. across, the petals oblong-suborbicular, 11 mm. long, 10 mm. wide, the apex rounded; stamens ca. 22; disc hirtellous, style glabrous, the stigma clavate.

CULTIVATED: E u r o p e : Kew, *G. Nicholson* 1006 (A); Breslau, Scheitniger Park, *C. Baenitz*, June 20, 1905 (A). United States: Arnold Arboretum 5953, without collector, June 11, 1914 (A, LECTOTYPE).

This is a rare variety. I have seen it only once, on Rockview Street, Jamaica Plain, Mass.

31. *Philadelphus salicifolius* Koch, Dendr. 1: 337. 1869.

Philadelphus coronarius var. *salicifolius* (Koch) Jäger, Ziergeh. ed. 2, 236. 1884. — Dippel, Handb. Laubh. 3: 337. 1893. — Schneider, Ill. Handb. Laubh. 1: 374. 1905. — Rehder, Man. Cult. Trees Shrubs 277. 1927; ed. 2, 271. 1940. — Chen, Ill. Man. Chin. Trees Shrubs 375. 1937. — Bean, Trees Shrubs ed. 7, 2: 412. 1950.

Philadelphus coronarius forma *salicifolius* (Koch) Voss, Vilmor. Blumengärt. 1: 290. 1894. — Rehder, Bibl. Cult. Trees Shrubs 193. 1949.

LECTOTYPE: Arnold Arboretum 18070, S. Y. Hu, June 14, 1951 (A).

A dwarf compact shrub up to 1 m. high, the second year's growth castaneous, the bark exfoliate, the current year's growth glabrous or glabrescent. Leaves lanceolate, those on the flowering shoot 3.5–7 cm. long, 1–1.5 cm. wide, acuminate at both ends, glabrous on both surfaces, rarely with few weak hairs on the principal nerves beneath, remotely and inconspicuously serrulate, those on the vegetative shoots 8–13 cm. long, 2–3 cm. wide, occasionally ovate on abnormal off-shoots, 7–8 cm. long, 5–6 cm. wide, acute or rounded at the base, acuminate at the apex. Flowers ternate, solitary or on depauperate racemes, the pedicels 2–4 mm. long, glabrous or sparsely villose, the hypanthium and calyx glabrous; sepals ovate-lanceolate, 5–6 mm. long, 2 mm. wide at the base; corolla stellate, 2–3 cm. across, the petals oblong-lanceolate, 1.2–1.4 mm. long, 5 mm. wide, the apex acutish, hirtellous; stamens ca. 21, the rim of the disc pubescent, style 5 mm. long, glabrous, divided almost to the base, the stigmas clavate, the abaxial surface half as long as the adaxial.

CULTIVATED: Europe: Bot. Gart. Forstakademie, Hannover, H. Zabel 27 (A); Hort. Bot. Leipzig, C. K. Schneider, June 26, 1904 (A); Hort. Simon Louis, Plantières, C. K. Schneider, June 25, 1906 (A). United States: Arnold Arboretum field no. 5875, E. J. Palmer, May 11, 1936 (A); without collector, June 21, 1916 (A); 18070, June 21, 1927 (A); S. Y. Hu, June 14, 1951 (A, LECTOTYPE).

This distinctive taxon probably originated in Germany. Koch recorded its existence as early as 1869. In the last three quarters of a century, botanists and horticulturists were inclined to interpret it as a variety or a form of *P. coronarius* Linn. This is probably due to the fact that suckers with broad-ovate *coronarius*-type of leaves often shoot from a normal dwarf *salicifolius* plant. Nevertheless, the distinctiveness of this taxon does not lie in its leaf-form. Its depauperate inflorescences, stellate corolla, oblong-lanceolate petals hirtellous at the apex, its small number of stamens, its much divided style, and its pubescent disc are of sufficient distinction to warrant specific rank. Its relationship seems to be closer to *P. caucasicus* Koehne than to *P. coronarius* Linn. Although this species has been known for almost a century, its distribution is very limited. So far as I know it exists only in a few botanical gardens. This lack of popularity among growers is probably due to its shy-flowering nature. It came to America in 1908 through the Arnold Arboretum, where it has been propagated by cuttings. Späth Nursery at Berlin, if not the originator, has been the chief distributor of this species.

(To be continued)